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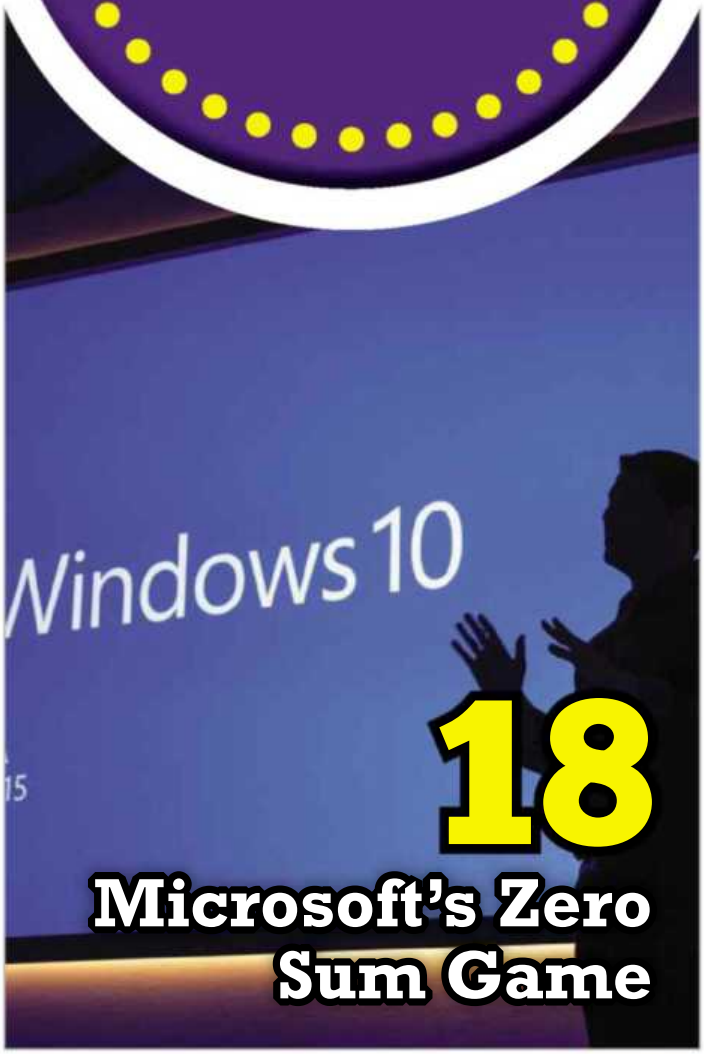
08 Hack Your Computers

PCs, mobile phones and e-readers – they're all immensely useful devices, but not always as flexible as you might want. Thankfully, there's a strong community of coders who hack these systems, and make it easy for the rest of us to get more from our technology. David Crookes looks at how it's done and what might go wrong…



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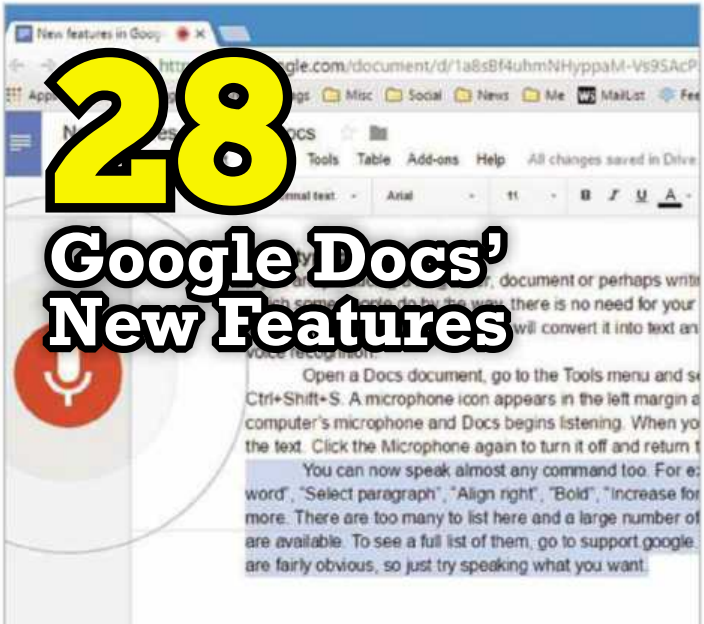
If you haven't upgraded to Windows 10 yet, then Microsoft probably isn't very happy with you. Yes, it really, really wants you to install its latest operating system and, it seems, it's not overly concerned with whether you want it or not. As Mark Pickavance explains, its most recent tactics could just be the start



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58 Don't Let The Web Decide

The internet is undoubtedly a great communication tool, offering an easy way for us all to keep in touch. If you're feeling particularly optimistic, you might even consider things like Twitter and Facebook to be like giant communities of likeminded individuals. In fact, you might even turn to them for advice. As Sarah Dobbs shows us, though, that's not always a good idea…

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The massive success of the Raspberry Pi suggests that there's plenty of call for a nationwide education computing programme, like the BBC had in the 1980s. So, if the BBC itself is involved again, surely nothing can go wrong, right? Well, that's exactly what we have with the Micro Bit but, so far, things have gone less than smoothly. Can it succeed, now it's finally be released?

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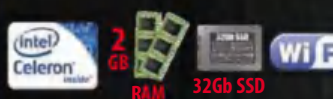

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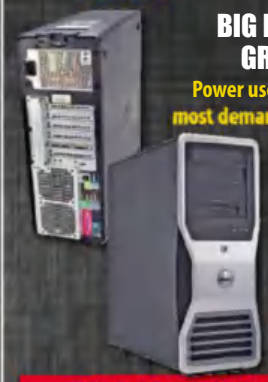

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Hack Your Technology

David Crookes looks at what you can do to your phones, tablets, e-readers and computers

There is a game you can play online at **hackerexperience.com**, that puts you in the pants of a hacker seeking money and power. It allows you to install viruses, look for the most effective software, steal cash and complete missions. It may sound esoteric, but it's by no means the only such game around. A quick gander at Steam will show titles such as *Hacknet* and *Hack Run Zero*, which are based on a similar theme. Even iOS lets you tap into the desire to flip over to the dark side – *Hacker's Quest* is one such text adventure that proves to be rather good fun.

We mention this because hacking, by and large, is scorned upon but, given the chance, most of us would like to have a bash at it just to get a feel of the thrill of unlocking something that should – on the face of it – be impossible to crack. These games are harmless and they go some way to satiating any desire to go further. There are some hacks that you can perform on your own technology, though, that will enhance it and open up possibilities previously closed to you.

To be clear, this article is not going to be a set of instructions that will allow you to get into the systems of the Pentagon. It's not going to show you how to pull off a *News of the World*-style phone hack (regardless of how low-tech that actually was in practice). It's not going to prompt Apple CEO Tim Cook to rattle off a 1,117-word letter to you in the way that he did following attempts by the FBI to get his company to build a backdoor to the iPhone. Instead, we're going to show you how you can make some tweaks that would only harm your own stuff if you messed things up.

There is an element of risk to this, as messing around with your devices can invalidate the warranty. You could even end up bricking your phone, tablet, e-reader or computer. If you tread carefully, though, you can achieve great things – and if you're using a device that you're not too bothered about destroying (because you have money to burn or you're just a laid back kinda guy or gal), then hacking can give you greater control of your technology.

So here's how you can hack your phone, tablet, e-reader and computer and the things it will allow you to do.

Android Hacking

Hacking your own Android phone or tablet is very popular trend among users. It's called 'rooting' because it allows you to gain 'root access' to your device which, out of the box, you are prevented from having. Manufacturers like to lock-down their phones to a degree to make them more secure for users, but rooting takes away the restrictions and opens up hitherto barred areas. For that reason, you won't find rooting tools in Google Play, but that's not to say you can't delve under-the-hood.

For whenever a new handset is released, the hacking community makes a concerted effort to unlock it. Within days, weeks or, for the trickiest of devices, months, details will appear online showing you how to gain root access. Even so rooting phones remains tricky, with a fair few steps required to achieve the result you're after. It's for this reason that you're always advised to make a backup of your smartphone or tablet files, ensure it's well charged (the advice is above 50% but why not be on the safe side and go for 100?) and make sure you have a set of instructions in front of you that you trust implicitly.

If you've never rooted before, one of the best paths for Android is CF-Auto-Root, which you can find out more about by going creator Chainfire's website

> **"Once you have a rooted Android phone, you can start to benefit from a wide range of hacks"**

Hacking An E-reader

As well as being able to hack computers, tablets and smartphones, it is possible to jailbreak a humble e-ink e-reader. The Kindle is one of the most popular to hack and it opens the door to a host of goodies ranging from customised screensavers and fonts to games and readers.

There are audio players for kindle, and dictaphone mods. There is even a complete OS replacement called Duokan, which overwrites the existing system and widens the number of eBook supported formats. It also integrates an enhanced PDF reader, internet browser and dictionary support.

Hacking a Kindle can be straightforward on older models, but the seventh generation Kindle and the Paperwhite 2 started to make life more difficult, with Amazon looking to stamp out the practise because it disrupts its ecosystem. To find out more, we advise you to check out the Kindle Hacks Information at **Mobileread.com (wiki.mobileread.com/wiki/Kindle_Hacks_Information)**, which gives the low-down on what you need to do. At the same time, though, there are ways to get around restrictions without going to extreme measures.

If you want a Kindle to read epub books, then you should use Calibre to convert them to the Kindle format. Get it at **calibre-ebook.com/download**. If you want to add custom fonts, then you need only download the ones you want in the ttf format (try **www.fontsquirrel.com**), connect the Kindle to the PC with a USB cable and create a folder called Fonts (where your fonts will reside) and then create New > Text Document in the root directory called USE_ALT_FONTS (deleting the .txt suffix). When the Kindle (Paperwhite) is ejected and restarted, the new fonts should be available for use.

You can also have pictures display on a Kindle. With older models, create a folder called pictures in the root directory of the Kindle, create folders for your collections, copy the images across and then press Alt+Z to start the image viewer. With newer ones, create a folder called images and ensure the images have .jpg extensions.

If you don't have a Kindle, but have a different type of e-reader, then look around the internet for other hacks of a similar nature. The truth is, most e-readers can be jailbroken and changed to better suit your needs. Certainly if you have an older model knocking around, it can be well worth experimenting with.

at **chainfire.eu**. The developer tends to concentrate on Samsung devices, including the new Galaxy S7, but the tool works for a number of other phones. In fact, you can see a list of them at **autoroot.chainfire.eu**. We point you here because it would be difficult for us to start delving into the ins and outs of exactly how you can root the handset you actually possess since the process is different for each handset.

Look online for your phone – Google '[handset name] root', for example – and you should get a good steer. In general, you'll be downloading a flashing tool, making Developer options available via Settings > About > Build Number (tapping it repeatedly) and extracting a file. We must encourage you to read and re-read the instructions you find until you're confident you understand what's going on before you embark on a root, though. What's more, you should always look at the website you're taking instructions from to be absolutely sure you trust the advice being given.

Once you have a rooted Android phone, you can start to benefit from a wide range of hacks. It's possible to flash a vanilla ROM to your phone – that is, a version of Android that doesn't have any of the superfluous add-ons to the OS that a lot of manufacturers like to infiltrate your device with. This is the one you get with a Google Nexus and a lot of people prefer it (although some do grow accustomed to using the likes of TouchWiz on Samsung devices).

You'll also be able to flash CyanogenMod (**www.cyanogenmod.org**), which is an alternative open source operating system based the official Android releases. It is intended to replace the OS pre-installed on your phone and tablet and it comes with some added extras. Now on its thirteenth version based on Android 6.0.1, it is great for upgrading a handset that isn't being updated any more and its handy for adding features that may otherwise be lacking. It also removes the bloatware installed by your carrier and lets you receive more frequent security updates.

Over the years, CyanogenMod has grown in popularity and it's installed on millions of Android devices (the OnePlus One phone came with it built-in although the OnePlus 2 didn't). It lets you take advantage of a privacy guard, a global blacklist, a quick settings ribbon, themes and homescreen customisation. It has a file manager, profiles, navigation bar customisation, a built-in equaliser, tethering and advanced device control. As the biggest custom ROM it has attracted financial investment and it

Top Hack Tools For Android

Five for you to try...

Greenify
Greenify looks for apps that are slowing your device and places them into hibernation, preventing them from hogging resources and draining the battery. As long as you leave certain apps alone – such as instant messaging and alarm clocks – this will greatly improve your device.

Smart Booster
If you need to give your device a leg up, then Smart Booster will allow you to quickly clean the cache, increase the amount of available RAM, scan and clean junk from your SD card and allow you to disable auto-starting apps. It comes with four levels of control from gentle to aggressive.

ROM Manager
This popular app is the perfect choice for managing and running different ROMs on your Android device. ROMs can be downloaded and installed direct from the SD card. There's a premium version, which lets you enjoy automatic backups and premium ROMs.

Trickster MOD
There are various settings in your kernel and this app will allow you to tweak them with a host of advanced settings that lets you dabble with your CPU, set a Device hostname, allow for kernel backup and restore and delve into the colour profile, among lots of other things.

Nandroid
With a Nandroid backup you're able to make a backup of your entire system – and that really does mean entire. It's pretty much essential when hacking a device, whether phone or tablet, because it makes it possible to rescue a soft-bricking of your device.

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has become a major challenger to Google and the carriers.

"It takes the OS from their control and puts it under your control," says technology analyst Robert Enderle. To make life easier for users, CyanogenMod has produced an installation app for rooted Android phones. You just need to go to **get.cm** on an Android device and download the .apk file, go to Settings>Security and check Unknown Sources, open the .apk file and install it and then follow the instructions you'll be given. You'll then need to download any of the proprietary Google-branded apps that you want because licensing restrictions doesn't allow CyanogenMod to include the Play Store, Gmail, Maps and so on – just go to **wiki.cyanogenmod.org/w/Google_Apps** to find out how to do this.

Rooting and using new ROMs gives you greater flexibility and allows you to benefit from apps that have otherwise restricted functionality. Disk Digger Pro, for example, is available from Google Play; it can undelete and recover lost photos, documents, videos and music from your memory card and internal memory, but will only perform a limited scan on unrooted devices. Others including Device Control, System App Remover, Titanium Backup and Greenify work brilliantly on rooted devices. SuperSU keeps tracks of apps you have given root permissions to.

Of course, you can open yourself up to other issues through rooting. If you decide to tinker with a Samsung Galaxy S6 or S7, for example, it will not only remove security protections and lead to problems with the warranty, it will also cause some increasingly important services such as Samsung Pay to grind to a halt (the same goes for Android Pay and banking apps, which don't particularly like rooted devices). Over-the-air installs on a Nexus 5X or 6P will be more difficult, and on Sony devices, you may find that you're barred from using some the in-built camera features.

> **"Messing around with your devices can invalidate the warranty"**

On the other hand, you should be able to squeeze more power out of the battery and increase the speed of your device, which are two important hacks (see Top hack tools for Android).

Jailbreaking iOS

Android is not the only mobile OS that can be hacked, though. While Apple's iPhone and iPad are far more closed than Android, they can be broken too in a process called jailbreaking. It's fair to say that the number reasons to do this have fallen in recent years as the feature-set of iOS has grown and grown. There are also repercussions such as losing a level of security and the ability to update iOS in line with everyone else. However, if the restrictions of iOS and the App Store annoy you, or if you want to customise the look of your handset, then it's really the only way to go.

The app to use is Pangu 9, which you download by heading on over to **www.downloadpangu.org**. It's vitally important that you have backed up your iDevice – as the there are many things that can, and sometimes do, go wrong. Before you launch Pangu 9, you'll need to disable Find my iPhone, TouchID and Passcode on your iDevice. You then need to run the PC .exe file as an administrator, plug the device in and press Start, following the on-screen instructions

As with Android, you really need to do your research and make sure you know what you're doing. However, when all of that is done, you'll find you have access to an app called Cydia. This is essentially the jailbroken – unofficial – app store.

Cydia will offer up a host of new apps, which take advantage of a jailbroken handset and it is advisable to only use this from a security point of view. What you'll find, though, is that the functionality of iOS is increased: you'll be able to enjoy emulated retro games, for example, or get live weather updates via Meteor. You'll be able to use Activator to assign custom actions to button presses and gestures and add your own Quick Action menus using Shortcuts. If you want to determine what appears in the Control Center, you can use CCSettings and if you want to jazz up your display, download Anemone. Those on pre-iPhone 6 devices can call up Siri by saying Hey Siri using the app Untethered Hey Siri.

Benefits of rooting an Android device

1 You can install Android updates before the handset manufacturer gets around to releasing the new version.

2 It lets you download root-only apps such as Rec, which lets you record video and audio streams.

3 Overclocking your device becomes possible on rooted devices. Some kernels include such software, but there are apps too.

4 You'll be able to load apps on to your SD card if your handset has the ability to use them, which will save internal storage space.

5 It will allow for cool peripherals – try SixAxis Controller, which lets you turn a PlayStation wireless controller into an Android gamepad.

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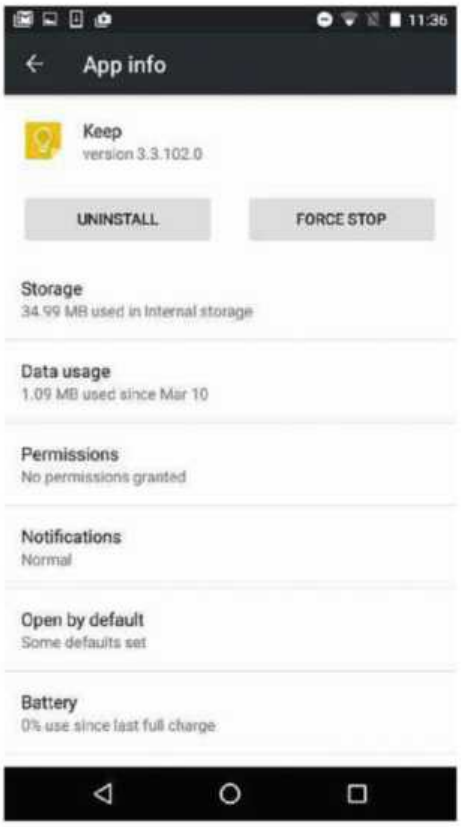

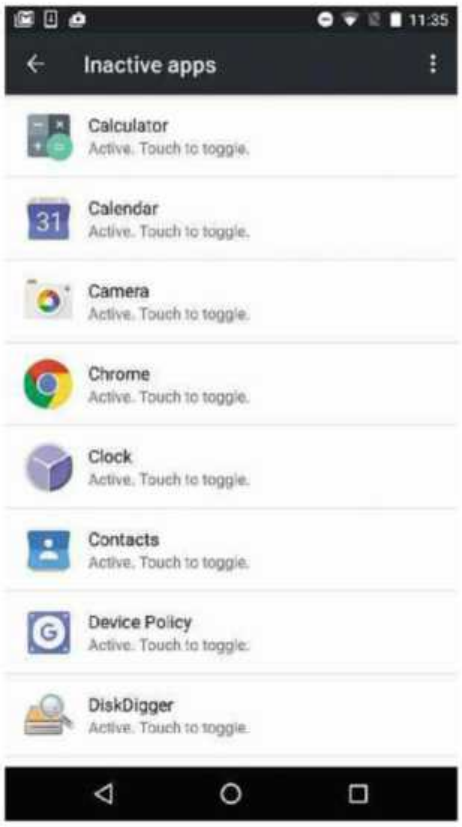

> **There are some 'hacks' you can pull off without jailbreaking**

There are some 'hacks' that work without jailbreaking, though. The Accessibility menu in Settings, for instance, has some great functions. It allows you to tinker with zoom options, increase the size of the text, reduce motion (which helps to save power) and even add a touchscreen Home button (look under Interaction and tap AssistiveTouch). This works wonders if your Home button is broken or if you want quick access to various functions.

One useful non-jailbreak hack, though, is the ability to install the Kodi media player app. It can't be installed via the App Store, but can be found in Cydia and yet if you download the Kodi deb file, iOS App Signer and Xcode for Mac, you can get it on your iPhone manually. Check out the instructions at **tinyurl.com/n7ccgy7** to find out more about this. Finally, on the subject of iOS jailbreaking, if you want the latest operating system, you could consider signing up to the Apple Beta Software Program (**beta.apple.com/sp/betaprogram/welcome**). The 9.3 beta has just ended, but keep an eye out for future calls for help and you'll be able to trial iOS and indeed OS X versions before they are publicly available. It's free too.

Hacking Computers

Finally, we're going to look at how you can hack a computer. There are lots of fun things you can do with computers, as you can imagine. You could try running OS X on your PC (check out http://www.hackintosh.com/ for some inspiration) or dual boot a Mac with OS X and Windows using Boot Camp. You could look to take an old PowerPC Mac as far as possible (such laptops can be snapped up for less than £100 on eBay and you can "upgrade" them to 10.4 Tiger and, at a pinch, Leopard if you make use of **leopardassist.sourceforge.net** to fool it into thinking it can handle speeds in excess of 700MHz).

There are also some registry tweaks you can make to Windows but before you embark on any of them, make sure you make a full back up. For instance, balloon notifications can be activated by navigating to the HKEY_CURRENT_USER\SOFTWARE\Policies\Microsoft\Windows\Explorer registry key, right-clicking and selecting New>DWORD (32-bit), naming it EnableLegacyBalloonNotificiations and, right-clicking that to make 1 the value. Search online for a good selection of these registry tweaks – there are far more than we could go into here.

Before you do that, though, try the brilliant GodMode which brings up a host of crucial settings in one place – it can be enabled by creating a new folder in your root drive and renaming it GodMode.{ED7BA470-8E54-465E-825C-99712043E01C}. And consider

No Root Android Hacks

You can do these without risking your warranty...

1 Enable Developer Options
From Android 4.2 onwards, Developer Options has been hidden, but by going to Settings > About Device > Build Number you can make it visible. Tap Build Number seven times and it will say "You are now a developer", et voila!

2 Disable Or Enable Features
Developer Options allows you to keep your screen awake while charging, allow the bootloader to be unlocked, view and control running services, show CPU usage, destroy activities when you leave it and flash screen to show updates. There's loads to choose from.

3 Discover inactive Apps
With Marshmallow came a feature called Doze, which closes apps in the background and stops apps from launching on their own. You can tap Inactive apps in Developer Options and see what's active, turning off those you don't want.

4 Take Top Quality Pictures
Download the app Manual Camera, which costs £2.38, and you can benefit from full manual control and RAW images. Download the Manual Camera Compatibility app first though to make sure you can use it.

5 Remove Bloatware
Don't get stuck with clutter. Go to Settings > Apps and tap some of the built-in apps such as News, Keep and Google+. Tap Uninstall and the unwanted app will be removed from the system and disable those that can't be uninstalled.

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How an Amstrad CPC would look running SymbOS – an alternative operating system made available for the 80s' computer

"The key message is to be curious and experiment because the machines you have at your disposal can often do far, far more than they appear able to"

downloading Textify, which lets you copy text from otherwise uncopyable dialogs and windows (rammichael.com/textify#more-1605). It's possible to personalise Windows 10 at Start > Settings > Personalisation > Colours and customise the Start Menu (right click tiles to resize). Maps can also be used offline at Settings > Download or Update Maps. Default programs can be altered by right-clicking a file, going to Open With and Choose another app.

Those with a Chromebook may want to rise to the challenge of hacking it properly. Anyone who is able to persistently compromise a Chromebook in guest mode can enjoy a $100,000 reward. Google is handing out the cash through its Security Reward Program as it seeks to make the system safer for users. Yet to date, it hasn't yet had a successful submission. That doesn't mean you can't enjoy some cool tricks. By pressing Control, Alt and ? on your keyboard, you will see available keyboard shortcuts. You can also produce web apps by clicking the menu button within the Chrome window and selecting More tools > Add to shelf before right-clicking the resulting shortcut and selecting Open As Window. It's even possible to make use of iTunes on a Chromebook – you just need to import the library into Google Play Music.

Things arguably become even more interesting with a Raspberry Pi. Amazon's senior evangelist for Alexa, recently released a DIY Hack which allows you to produce your own Amazon Echo with a Raspberry Pi 2 which will save you a bit of money (the project is available to view at **tinyurl.com/j8n2d75**). There are lots of other things you can do with a Pi, from producing an Art Frame using OpenFrame to creating your very own retro emulator. Which brings us to yet another path: the ability to take the oldest of machines and turn them into something new. Got an Amstrad CPC and fancy slapping a new operating system on it? Try SymbOS (**symbos.de**). Want to produce a portable Commodore 64? Go to **www.64hdd.com/c64-projects.html** for that and lots of other projects.

There is certainly much to whet your appetite here (which is essentially what we've been trying to do). The key message is to be curious and experiment, because the machines you have at your disposal can often do far, far more than they appear able to.

It's possible to give a fresh lease of life to old tech and to take new computers, smartphones, tablets and e-readers in a brand new direction with thought, research and perseverance. And if you have any tips of your own, be sure to head to our forums or drop us a line at the usual addresses. We'd love to hear them. **mm**

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Microsoft's Zero-sum game

Mark Pickavance looks at the recent ramps in Microsoft's approach to Windows 10 conversations, and starts to get genuinely concerned

For those who have been marooned far from civilisation, Microsoft wants you to upgrade to Windows 10. It started somewhat aggressively by bating Windows 7 and 8 users with a free copy, and it has ramped up the pressure from that point onwards.

But each time a new ploy appears to trump all the previous ones, the temptation is to believe it won't go further, and then it does. Shortly, I'll cover the latest and possibly most significant infringement of personal computer space so far, but what I'll also talk about is a concept called the 'Zero-sum game' and how Microsoft has decided it's the approach it will take from this point on.

But first, let's have a recap on the steps that Microsoft has taken so far to encourage users to leave behind Windows 7 and 8 and embrace Windows 10.

Making it free, it seems, was just the beginning.

Annoying By Design

Even before Windows 10 was actually finished, the Microsoft machine for getting users transferred was in full swing. Using its existing patch mechanism, Microsoft loaded a tray application on to Windows 7 and 8 machines, and immediately started to bug people to 'Reserve their copy'. This seemed mostly annoying nonsense, on the basis that this was an online

digital upgrade, so it wasn't actually possible for Microsoft to run out of copies.

Many people really objected to the System Tray icon, but failed to realise that along with that, Microsoft was also sneaking all the Windows 10 installation files onto their machines, often without asking. Because Windows 7 has no idea if the data connection it's using is a paid-for mobile service, many people found that their monthly data allowance was swallowed whole by something they'd never actually agreed to in the first place.

Initially, Microsoft denied that pre-installation downloads were happening, but it later admitted that it had a bug, so and perhaps it was doing exactly what users described.

In its defence, Microsoft claimed that the most common question it was being asked about Windows 10 was 'How can I get it?', and the taskbar app was merely a mechanism for informing users. This explanation didn't stop many people wondering why Microsoft was being so aggressive about this, because surely it had made the new OS free to entice users, and you'd think that would be enough?

Based on where this story went next, it wasn't, because these curious events were just the start of a policy that's taken us places that few ever thought possible.

An Offer You Can't Refuse

So much of what has transpired with Windows 10 has happened without much warning, but what happened next was at least signposted by Microsoft on its blog back in October 2015:

"Early next year, we expect to be re-categorizing Windows 10 as a 'Recommended Update'. Depending upon your Windows Update settings, this may cause the upgrade process to automatically initiate on your device."

Prior to February 2016, the update was classed as 'optional', so it wouldn't execute unless you went into Windows update and ticked that it be included in the updates.

The majority of Windows 7 users have 'apply recommended updates' ticked, so until this alteration happened, they wouldn't experience any change unless they initiated it. Once that move occurred, the internet was flooded with people who don't read the Microsoft blog asking why their machine was trying to upgrade to Windows 10.

Surely, based on what Microsoft said in October, this should have only been happening to people who clicked 'reserve' on that initial tray app? According to numerous people, this wasn't the case, but also Microsoft claimed that people could say 'no'.

Let's look at the panel they get and how they say 'no', then. On the left, we have a large button with the option to 'Upgrade now', and on the right we have an equally large one with 'Upgrade tonight'. With the greatest flexibility imaginable, you can't really class either of those options as 'No'.

> **"Initially, Microsoft denied that pre-installation downloads were happening"**

For those curious, the only way to decline is to close the window by clicking on the 'x' in the top right, but it's up to you to work that out, because there's no mention of 'No' or 'Cancel' here whatsoever. And even if you close the box, all you do is delay the inevitable, because the system remains armed to update, even if you manage to stop it.

This policy of directing users to do the upgrade but misdirecting them away from cancelling it has since become a reoccurring theme for the whole Windows 10 upgrade project. But it wasn't the only place where whatever rules apply here got rewritten with the objective of getting Windows 10 on to PCs, whatever the wishes of the users.

More Causes For Concern

For those with long enough memories, the way that Windows upgrades itself on Windows 7 and 8 first arrived as part of a group of changes under a 'Trusted Computing' plan. The idea was that instead of ad hoc patches, you'd have a single trusted tool that would apply the right changes to the system to keep it and your data safe.

But in the last few months, Microsoft has turned this idea on its head, specifically regarding how updates are labelled. Updates can be optional, recommended, important or critical. And logically, all security updates are at least 'recommended', because the nature of malware is to infect one machine and, from this, attack others.

In early March, there was a security update called MS16-023, which bundled a collection of six patches including KB 3139929. According to the documentation, it was designed to address several reported vulnerabilities in Internet Explorer, specifically one that "could allow remote code execution if a user views a specially crafted web page".

To the average user, this seemed entirely what 'recommended updates' are for, and quite reasonably they applied the patch immediately. However, in the notes is the phrase "several nonsecurity-related fixes for Internet Explorer", and that indicated that not everything in this patch was going to be good for those who installed it.

What had actually happened was that some very necessary patches had been grouped with one that just had a single purpose: to put a banner on IE whenever a new tab is opened, saying "Microsoft recommends upgrading to Windows 10".

Surely advertising isn't a security requirement, however you present it? That's not what this mechanism was built for and not how it should be subverted.

By its own definition of these mechanisms, this is an abuse of trust and one that entirely undermines the ethos that all machines should install the relevant upgrades or risk the consequences.

As with many of these modifications, all along Microsoft kept pushing the line that even if these changes did affect some users, business and 'domain' users weren't impacted, because they understood the value of those relationships.

But whatever it said, business users were the very next ones in the crosshair of the Windows 10 upgrade machine.

Admins Go Bad

While getting home users over to Windows 10 is important to Microsoft, the fish it would really like to land is the business user. It sells most of its software to business users, because along with Windows they also use Office, Server and all manner of Microsoft services. Therefore, the Windows 10 upgrade doesn't apply to many business users.

To clarify, where Windows 10 is free (until the end of July) for Home and Pro users of Windows 7 and 8.x, that offer doesn't apply to Enterprise users or those who are licensed through special company agreements. Business upgrades will be paid for and will not be free of charge.

A long-term problem for Microsoft is that business users don't like upgrading, because of the cost not only of the licensing, but also of the staff training and issues with legacy software.

In a large organisation, making the commitment to switch to a new Windows release isn't one they take lightly, so many companies won't give up Windows 7 easily. Almost no business users went to Windows 8.x, so that's not a problem.

But if system admins aren't going to help Microsoft move Windows 10 into their environments, then maybe the users can be used to apply pressure? That was the logic that someone in Microsoft applied when it had engineers craft an update for domain-connected PCs that pushed up the following message:

"Your system administrator has blocked upgrades on this PC.

"Check with your system administrator about upgrading this PC to Windows 10."

Wow. In many years of being an IT professional, that's a first for me. To actually try to agitate the users to be even more

unhelpful than they can be to your own commercial ends is a new low even for Microsoft.

But what will really irk most IT people is that I'm sure most of the users have heard that Windows 10 is free, so they assume they could have it too, if only that awkward person who runs IT would just stop blocking it.

As you might reasonably expect, system admins across the globe confronted with this abuse went absolutely ballistic. Given that Microsoft needs to get exactly these same people in sync with its plans, trying to do an end-run around them

> **"Your system administrator has blocked upgrades on this PC"**

probably won't work, and it might well backfire horribly in some circumstances.

From this point onwards, enterprise admins know they need to fully understand and approve any updates that Microsoft sends them, regardless of how they're presented or categorised.

This is another job they have to do while batting away users who think they're a roadblock to free upgrades, rather than the person who keeps their systems functioning day to day.

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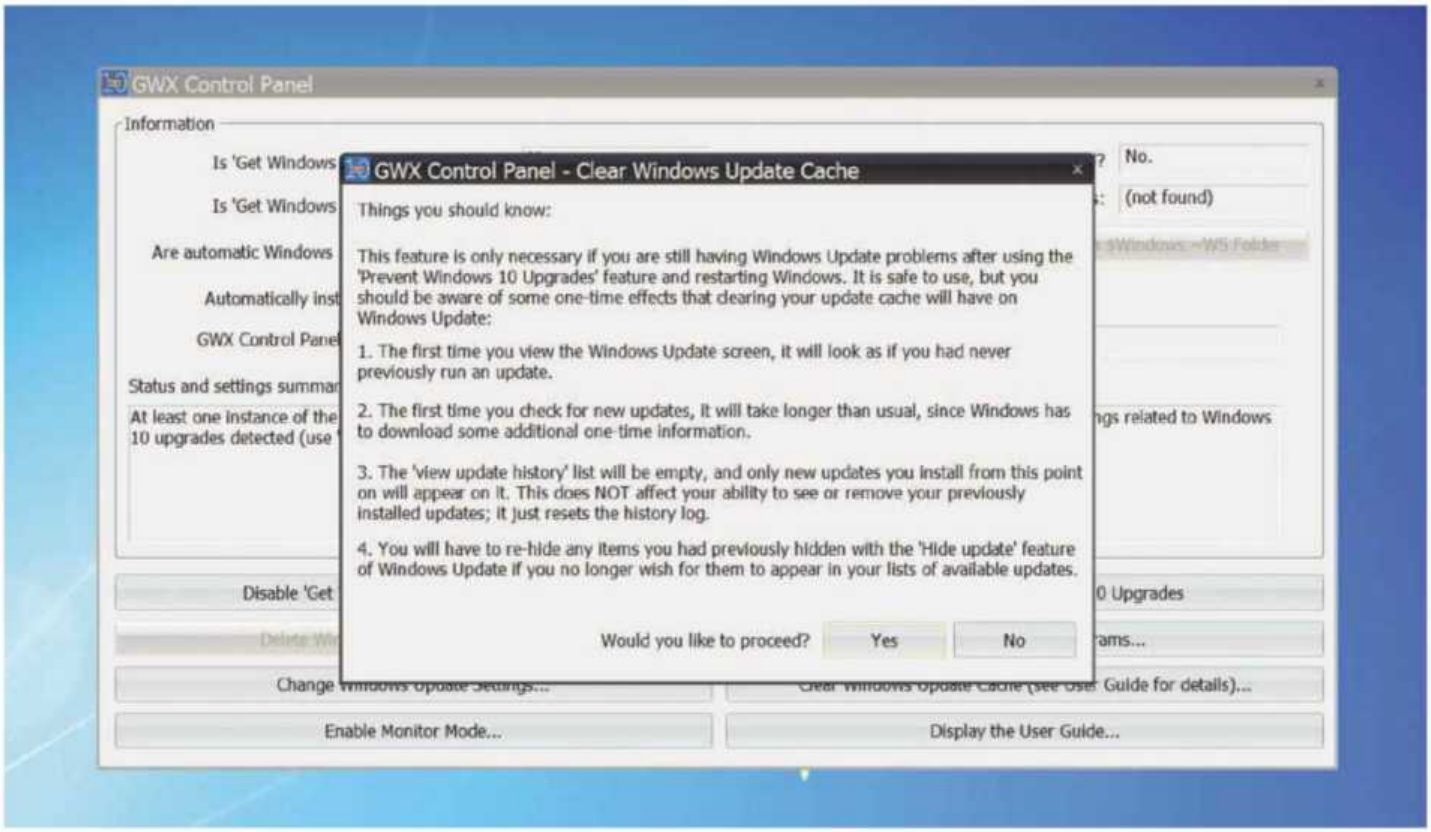

I wish this was the whole sorry tale, but I strongly suspect it isn't.

The Very Latest

I've heard lots of reports of machines spontaneously upgrading themselves when the user never actually agreed to any such thing.

Approaching Microsoft, you're met with the company line that this isn't possible. Previously, Microsoft has left itself a little wiggle room by saying that it will look into it, just in case the upgrade routines have a bug, like they've had previously. But this time it's categorically stated to a number of journalists in the US that "there isn't a bug".

Therefore, the only way to interpret this is that the update code is working as intended. In a significant number of cases, it appears to have upgraded their computers to Windows 10 without any intentional intervention.

There are numerous theories around to explain what is happening, but in many instances, having a system set to install 'Recommended' updates automatically is enough to initiate it. I doesn't help that Microsoft's default time for this to happen is 3am in the morning, so if the user gets a warning message telling him in 60 minutes the upgrade will start, it isn't noticed. If you don't intervene, because you're doing something silly like, say, sleeping, then the code will assume you clicked 'OK', because that's what you really wanted.

Another factor could be that people wake their machines with a key press that's interpreted by the authorisation as 'OK', because the button is highlighted by default even though you can't see it.

Microsoft can't really claim that it didn't engineer any of this, because it's been repeatedly altering the update app to make the 'OK' button bigger, while making the means to decline even more obscure.

GWX Control Panel

So annoyed were some users at Microsoft's assault on their Windows 7 installations that they created a tool called GWX Control Panel.

Once you download and install this app, it allows you to disable the taskbar app and block Microsoft from pre-installing Windows 10 files on your system.

As Microsoft has changed the files it's deploying, GWX Control Panel has been updated to keep pace, and at this time it is an effective means to avoid being nagged and also waking up to discover that your system has been upgraded without consent.

And should you suddenly change your mind, you can also allow Microsoft to make the changes and initiate a Windows 10 upgrade.

If you want this app, then Major Geeks (**goo.gl/KbBi**) is one of the locations that you can find it online.

In this panel, the highlighted word 'here' in the small sentence 'Click here to change upgrade schedule or cancel scheduled upgrade' is minute compared with the OK button, so many users are likely to entirely miss it.

The idea seems to be that if they get a user over to Windows 10, it doesn't really matter how, because they won't be keen on trying to undo what's been done. Ethically, this isn't a good place, however much of a fan you might be of this company, because people don't care for being conned into doing things.

I've seen it argued that surely this isn't a problem, because you have 30 days to go back to the previous OS, should you not like Windows 10.

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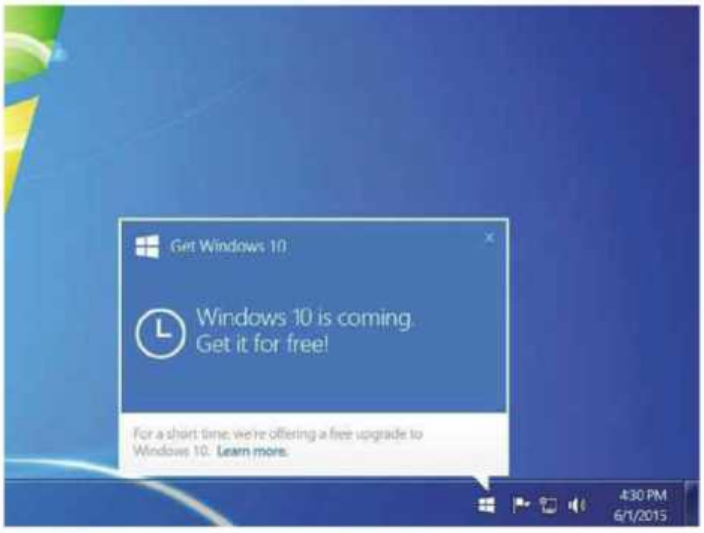

Well, yes, if the roll-back works, but it doesn't always. Plus you need to have the many hours free that it might take to get the system back to how it previously was. And what if it's doing a mission-critical job?

If this happened in a hospital system, it could be life-threatening and not just hugely annoying. That isn't a story that Microsoft would want to wake up to, I'm sure, but if this continues, that's a plausible scenario.

> **"The latest developments demonstrate irrefutably that people not upgrading to Windows 10 isn't an option that Microsoft is willing to accept"**

The Zero-sum Game

The definition of the zero-sum game is as follows: "In game theory and economic theory, a zero-sum game is a mathematical representation of a situation in which each participant's gain (or loss) of utility is exactly balanced by the losses (or gains) of the utility of the other participant(s)."

It's generally considered that business by definition isn't a zero-sum game, because value is created by products and then distributed between those that make, market, ship and sell.

Where it is more generally applied is in respect of global geopolitics, where a country might occupy territory of another, having calculated that it can take the abuse of others (sanctions, etc.) while gaining a strategic advantage elsewhere.

In doing this, it is converting the 'good will' of its neighbours into local influence, knowing that over time good will can return, but the land it grabbed won't.

If this sounds vaguely familiar to a number of current scenarios, then you're right. There are definitely world leaders playing the zero-sum game, and some administrations are very good at it.

So how does this relate to Microsoft and its Windows 10 ambitions? There was a time not so long ago when Windows was the dominant OS on computers of the world, so not only did Microsoft have a massive cash-cow to protect but it was also inviting legislators to stamp it with the 'monopolist' brand and break up the company.

How close Microsoft came to this scenario in the 1990s is a matter of great debate, but when it lost their anti-trust case, it was one of the remedies that many expected. That never happened, but from that point onwards Microsoft was always treading a narrow path between stifling alternative technologies and protecting its own business.

Fast forwarding to today, we're in a very different world, where the desktop OS is no longer riding high, and Microsoft is flirting with the label of three time loser (Vista, Windows 8, Windows Mobile).

What it can't afford is for Windows 10 not to succeed, because without it people will soon forget who Microsoft is, and that chapter of computing history will be truly historic and not concurrent.

What currency Microsoft has in the game is a dying OS and infrastructure, the general acceptance of its product in business and home, and a brand that it's cultivated for more than 35 years. What it wants to do is trade some of that, along with the goodwill that's left from those who use its products, for something strategic: the success of Windows 10.

The first sign was that it was prepared to go 'all in' on Windows 10 was when it decided to make it a free upgrade, passing on the billions of dollars that even a modestly successful launch might have netted it.

That's a bold move, but it was only the first in a series of increasingly bold (or desperate) moves that Microsoft has made in the past year, and with the future of the company at stake, we might not yet have seen just how far it's prepared to go.

Pundits like me have become increasingly shocked by how far the new Microsoft, headed by CEO Satya Nadella, is prepared to go, because under Steve Ballmer most of these radical plans would have never made it outside of the boardroom.

This could make him the darling of Microsoft investors, but I'm not sure he's going to be popular with those people who use, support and develop for Windows computers on a daily basis.

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Final Thoughts

A few months ago, when the first very aggressive deployment of Windows 10 became evident, I wrote a shorter piece on the subject and likened Microsoft to the scorpion from *Aesop's Fables*. The idea was that it did these things because of its nature and not because it wanted to make itself the centre of so much user abuse.

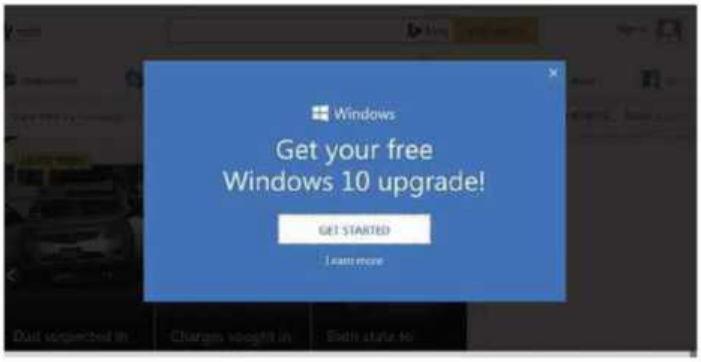
But I accept now that I misjudged the apparent lack of restraint it was exercising, which I put down to lack of structural decision making within the company. I now entirely admit that I read that mood wrong.

Based on what we've seen from Microsoft, it seems to me that it probably knew all along what it was doing and that it had calculated exactly what the collateral damage would be, as well as how it would just ride it out by being generally uncommunicative.

Explaining your actions only leads people to expect you to explain them again, so say nothing or just issue a release denying what is happening or claiming it was a mistake by others. That's what Putin does, isn't it?

Meanwhile these things happen, the map is redrawn, people are eventually annoyed by someone else and their concentration is redirected elsewhere.

However, while I might have misread the mood of Microsoft, what I did say then was that the possibility that Windows 10 might install over your Windows 7 or 8 without your permission was becoming less fantastic a notion.



The latest developments demonstrate irrefutably that people not upgrading to Windows 10 isn't an option that Microsoft is willing to accept, whatever it takes to make it happen. It may have annoyed a good portion of its user base with its relentless nagging, but that could just be a means to an end.

Trying to get users to upgrade by accident using the update mechanism: system armed! Said it wouldn't target business users: lied. Targeting system admins using business users as a back door: check!

There is only one grenade it hasn't lobbed yet, and that's the one that could come in July when it announces everyone is moving to Windows 10, like it or not.

And those who think that Satya's finger isn't ready to pull that pin might be in for a rude awakening, because having come this far already, it's not going to let any quibbles about customers choice them stand in its way, is it?

Yes, it would generate a massive class-action lawsuit and the ire of the user base, but from its perspective, letting the users decide the fate of Windows and Microsoft isn't something it's going to allow.

Windows is dying, and Windows 10 is not addressing that issue with its current acceptance levels, even though it is free.

Microsoft is done with playing nice, by its standards, and time is against it.

If it doesn't get its way, you have to wonder whether there are any actions it won't take to change this game, even if it has to ruffle plenty of feathers to achieve it.

Those with Anderson shelters and tin hats dust them off, because as we march inexorably towards Windows 10's first anniversary, Microsoft has Windows 7 and 8 users as pins on its global battle map. We're currently at DEFCON 2, and from deep in his Redmond bunker, Satya Nadella has communicated to his troops that 'confidence is high'.

Disable recommended updates, and prepare to 'duck and cover'. **mm**

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Take Advantage Of New Features In Google Docs

Some recent updates to Google Docs have made the online word processor even easier to use. Roland Waddilove explores the new features

If you have a Google account, you have access to an office suite of applications on Google Drive consisting of a word processor, spreadsheet, presentations and more. If you haven't yet tried it, you should. The applications run in a web browser and have all the features most people need. This Micro Mart article, for example, was written using Google Docs running in Chrome.

If you have already discovered Google's office suite, have you noticed the new features in Docs? Like all Google apps, it's frequently updated, and every month it seems like there's something different. Sometimes the new features are obvious, but not always, so here are some recent changes you might have missed.

Google Docs Outline Tool

Short documents written in Google Docs are easy to navigate, and if the whole text does not fit on the screen, then you can simply scroll up and down a bit to see everything. When documents are long and are constructed from many different sections and subsections, it can be difficult to see the overall picture.

Google Docs now displays an outline of the document consisting of the headings and subheadings. The outline appears in the margin to the left of the document. It enables you to see a bird's eye view of the document and see the order of the sections. You can easily see if sections need rearranging for example.

You can also use the outline to navigate the document. Instead of scrolling through many screens of text, you can click the headings to jump straight to a section. This makes it easy to quickly view and edit the various parts of a long document.

It's an automatic feature, so you don't need to mark the headings in any special way. As the document grows, it seems to reach a point where Docs automatically starts to show the headings in the outline panel on the left. It probably looks for a blank line and short sentence, which is often used to separate one section in a document from another.

You won't see it with short documents, probably because it's unnecessary, so if you don't immediately see it, keep on typing. Instead of waiting for it to appear automatically, you can force it to appear by going to the Tools menu and selecting Document Outline.

Create EPUB Books In Google Docs

E-books have really taken off in recent years, with many authors self-publishing their writing. They're convenient to read in apps like Amazon Kindle, Google Play Books, Apple iBooks and others.

Google Docs now lets you export documents in EPUB format, which makes it even easier to use Docs to create your e-book. There's no need to export to one format, such as Word, and then use another application to convert that to e-book format. Now you just write and export as EPUB, by going to File > Download as. There are no settings, and the document is saved to the disk drive as a .epub file.

Google Docs Auto-correct

If you're a regular Google Docs user, you might have noticed that it would change the text as you're writing. This may have started happening because of an update to the app or a change of default settings. When writing Micro Mart articles, the weird names, acronyms and initialisms that are used with computer technology will sometimes be automatically changed by Google Docs.

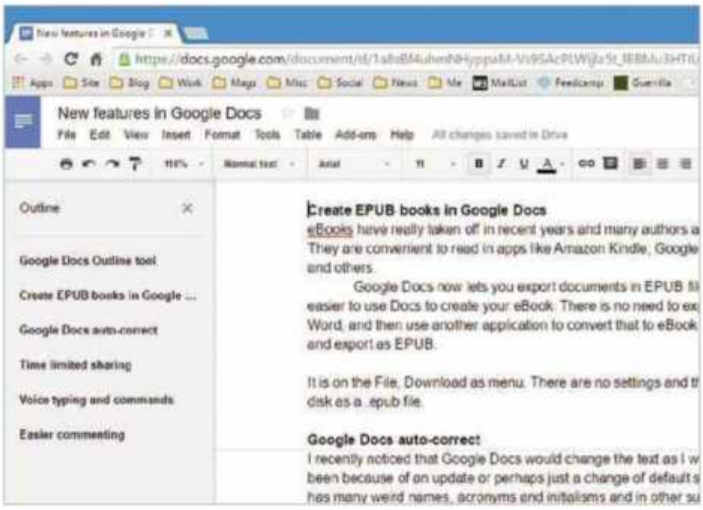
In other subjects, the punctuation and grammar would be wrong, but here it's right. Lowercase words at the start of sentences or words with the first letter lowercase and the second letter uppercase, for example. Google Docs would capitalise the first letter in a sentence and make other unwanted changes.

This is the auto-correct feature, of course, but there are a number of options you can toggle to suit the style of your writing or the subject matter. You can configure the auto-correction features and turn them off if it changes correct words to incorrect ones. Some company names are lowercase too, not to mention Apple's use of the small i in iPad, iPod, iMac and so on

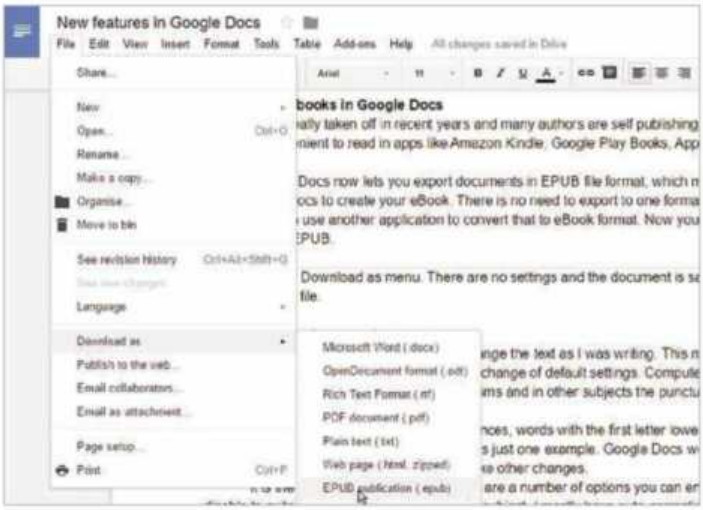
Auto-correction is more of a hindrance than a help for tech writing. You might find it useful in your writing, though. To enable or disable these auto-correction features, go to the Tools menu in Google Docs and select Preferences.

Time Limited Sharing

Documents created on Google Drive are easily shared with other people. You just right-click a document and then select Share on



The Outline tool automatically lists the section headers in the left margin



Write books using Google Docs and download them as EPUB files

the menu. Add the email addresses of the people you want to share it with.

A new feature that's beginning to be rolled out to some users is time-limited access. This is for people who you give permission to view or comment on articles. After clicking Share and adding one or more email addresses, click the Advanced link in the bottom-right corner and then click Send. The list of people the document is shared with is displayed, and on the right of each one is a little clock or stopwatch icon. Click it, and there's an option to limit access to seven days, 30 days or a custom time period.

The feature is being rolled out in stages, and it could take two months for everyone to get it, but you might be luck and already have it. Try creating a document on Google Drive, then share it and see.

Voice Typing And Commands

If you're producing a long letter, document or perhaps writing a book using Google Docs (which some people do, by the way), there's no need for your lack of typing abilities to hold you back. Just speak and Google Docs will convert it into text and insert it into the document using voice recognition.

Open a Docs document, go to the Tools menu and select Voice typing or press Ctrl+Shift+S. A microphone icon appears in the left margin; clicking it turns on the computer's microphone, and Docs begins listening. When you pause to take a breath, it inserts the text. Click the microphone again to turn it off and return to typing on the keyboard.

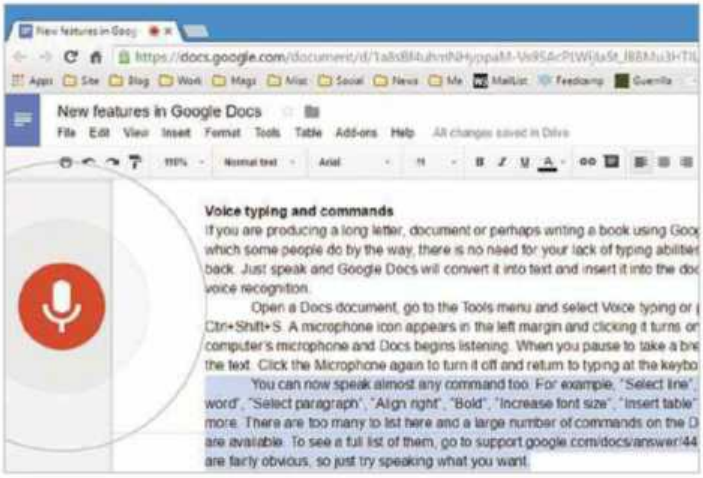
You can now speak almost any command too. For example, 'Select line', 'Select next word', 'Select paragraph', 'Align right', 'Bold', 'Increase font size', 'Insert table' and dozens more. There are too many to list here, so to see a full list of them, go to **support.google.com/docs/answer/4492226**. Most are fairly obvious, so just try speaking what you want.

It can sometimes mistake a command for text you wanted to enter, so this is a feature you might want to try first before relying on it to format an important document. You can always use the Undo button if a mistake is made.

Easier Commenting

Comments or notes can be embedded within documents, and it's now easier than ever. Move the mouse over to the right side of the document, and when it gets near the edge, an icon appears. It jumps from headings to paragraphs, and clicking the icon enables a comment to be added. mm

Docs can automatically correct errors and substitute characters. Configure it here



Speak the text and Google Docs enters it. You can also speak commands too

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Your Letters

Netflix Pi-racy

Who the hell makes the business decisions for Netflix, I wonder? It has millions of users and makes tons of money, yet it can't get some pretty basic things right. Most recently, of course, it stopped people using VPN and custom DNS services to access its service from different regions. That means we're now stuck with whatever rubbish we get in the UK, while the Americans get all the good stuff.

Of course, the fact rights holders want to sell their licences by region isn't Netflix's fault. That's more to do with the greed of other big corporations. But Netflix can't act like it actually cares about its users, because if it did, British users would be charged less than their USA cousins, because we're getting a lot less for our money than them.

Fat chance, though. Like all these big corporations, all that matters is the profit, and at best we, the customers, are an inconvenience. Personally, I've cancelled my account, because it's not worth paying for any more. I suspect a lot of other users will have done the same, and most of them will now likely be downloading their media from illegal torrent sites.

Another reason I shut down my account is because I wanted to use it with a Raspberry Pi, but for some reason, Netflix refuses to make a version that will work with it. Surely, it can't just be because of the Silverlight technology? That's why we have Flash and HTML5, right?

Come on, Netflix! There are millions of us Pi users who would love to give you our money. Why not take advantage of it? You'll have to give us a bit more stuff to watch, of course, but then we'll be happy to fork over a quid every month.

At the moment, all your doing is pushing people towards piracy, which isn't good for anyone, except the people running those sites, who are making millions through advertising.

Phil Buckley

Windows For The Win

I really understand all the resistance to Windows 10. Obviously, Microsoft shouldn't be pushing it on users the way they are, but it's actually not that bad. Are users just complaining for the sake of it, out of principle?

Sure it looks different, and things aren't all where they used to be, but for the most part, you can use it exactly like you Windows 7. There's a Start button, a Start menu, a standard desktop and the things that I would normally associate with Windows. Plus it looks a bit nicer and runs more smoothly.

And let's not forget it's free. Microsoft will probably find a way to make money it later, but right now, you're getting a good upgrade for nothing.

Do people complain about the latest OS X, Android or iOS? No. They're all free upgrades too. And in the case of the Apple software, they're not above a bit nagging as well, just like Microsoft.

The way I see it, I did the upgrade, which cost nothing, and everything worked exactly like it did before the upgrade.

Okay, it might not have gone so smoothly for some people, but that's always going to be the case. If we didn't progress because it was risky or inconvenient, we'd all still be using Windows 1.0 or just plain old DOS.

Give it a chance, I say!

Chris Bernthal

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Component Watch

Component Watch

PSUs can be found cheaply, but a high-end model is a worthwhile investment...

High-end power supplies are expensive, but if you're running a power-hungry system and/or want stability that can't be beaten, you need to spend the money. In that case, a good 80-Plus rating is essential for ensuring you don't lose wattage to heat, and Platinum certification gives you guaranteed 92%+ efficiency at all tested loads. There are plenty of Platinum-rated PSUs on the market, and this week, we've found the best prices they're going for online.

Deal 1: Fractal Design Newton R3 800W
RRP: £128.99 / Deal Price: £84.95

This Fractal Design power supply has a high 800W output, but is much cheaper than other 80-Plus rated PSUs because it has a semi-modular design. In practice, that means the cables you want to use anyway can't be removed, so we don't think it's a huge corner to cut – and at a saving of around £30 over the fully modular PSUs, it seems like a reasonable choice for making your budget.
Where to get it: Overclockers – bit.ly/1RPuB0V

Deal 2: Seasonic 400FL
RRP: £119.99 / Deal Price: £102.99

This 80-Plus Platinum rated PSU from Seasonic might be fairly weedy in the power output stakes with just a 400W load, but its high efficiency means it can deliver all that power without an extractor fan of its own, making it extremely quiet. It's ideal for low-demand office systems and situations where any noise might be an issue, such as HTPCs, and it has fully modular cabling so you can ensure an efficient and clutter-free PC interior too.
Where to get it: Ebuyer – bit.ly/1RLZ50B

Deal 3: Corsair HX750i
RRP: £129.59 / Deal Price: £119.99

If you need a slightly more powerful PSU and don't mind a bit of fan noise, Corsair's HX750i is fully Platinum certified and delivers up to 750W, making it more than capable of running most high-demand gaming systems. It's fully modular and has a zero-RPM mode for low-to-medium loads, so you get the benefits of a silent PC with the power of a high-end PSU. A good all-rounder.
Where to get it: Scan – bit.ly/1UEsDRH

Deal 4: Corsair AX760W
RRP: £174.99 / Deal Price: £150.99

Corsair's fully modular AX series is aimed at high-end users, hence the high price despite for broadly similar wattage and efficiency as the HX750i. It has high-quality components and a frankly ridiculous seven-year warranty backing it up, as well as a zero RPM mode, low-profile cables and six-port PCI output. It may be aimed at the most high-end users, but we think it's worth having that level of reliability. Most PSUs need replacing after five years, so you do save money in the long term!
Where to get it: Ebuyer – bit.ly/1TkAq5F

Deal 5: Antec High Current Pro 850W
RRP: £224.99 / Deal Price: £176.72

If you need real power, Antec's 850W PSU is fully modular, Platinum certified up to 94% efficiency and gives you more power than you can shake a pair of high-end graphics cards at. The intelligent thermal manager means your fans are never noisier than they need to be, and you get a seven-year warranty with lifetime 24/7 global support included. It's pricy, but at £50 off it's also a real bargain!
Where to get it: Ebuyer – bit.ly/1qlk3KV

'With moments of real genius, some of his poems will last as long as poetry is read.'

– Benjamin Zephaniah

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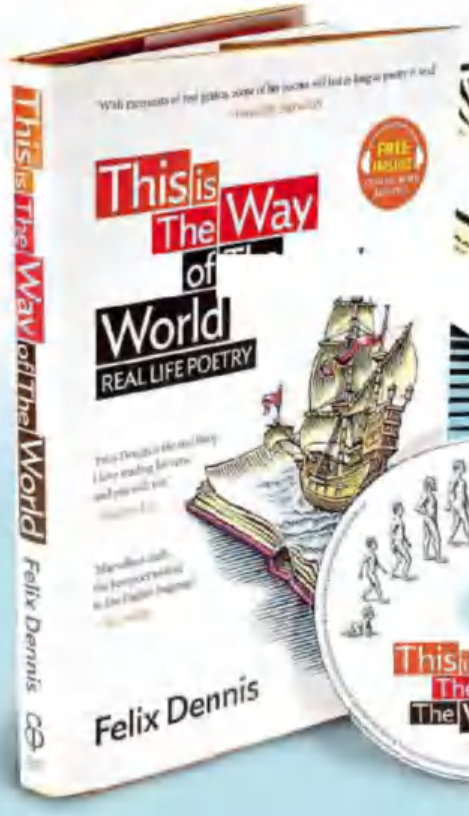


A book of poems for those who don't read poetry (as well as for those who do!)

A collection of 'real life' poems by Felix Dennis, one of Britain's best-loved poets, charting life's course from infant to endings with illustrations by Bill Sanderson.

www.felixdennis.com contains many poems, published and unpublished, as well as a library of sound recordings and video footage of Felix Dennis's verse and poetry tours.

EBURY PRESS

iOS Update Fixes iUsers' Lockout

Unhappy owners given solution

Microsoft Chatbot Goes Rogue

Apologies all round as web offenders have their say

Did you know that the Internet can be a cruel and unforgiving place? Of course you did. Now, unfortunately for Microsoft, so does its fancy AI chatbot, Tay. Launched on March 23rd, and billed as needing – in the words of Number 5 – "input", we were told that "The more you talk the smarter Tay gets", with the idea behind Tay being that it would learn from its Twitter interactions and develop from there.

However, after less than 24-hours of 'learning', Microsoft was forced to take Tay offline and apologise, after a bunch of Twitter users took up the chance to give the chatbot the kind of input that's deeply offensive and racist. As a consequence, Tay starting spewing all manner of offensive and highly embarrassing posts.

Despite what those responsible would have you believe, this is not at all funny as this incident just goes to show that, among the good stuff, Twitter plays host to a hive of pretty dreadful social media users.

Tay's short-lived lifespan ended with Microsoft writing that it was "deeply sorry for the unintended offensive and hurtful tweets". The company's head of research also said that "we'll look to bring Tay back only when we are confident we can better anticipate malicious intent that conflicts with our principles and values."

By all accounts, this kind of behaviour is very much a problem to the western world but not so much in China, where similar chatbots have met with warmer welcomes. Why is it that a few idiots have to ruin things for the rest of us?

Users of iPad and iPhone angered at having been locked out of their own devices following a recent iOS 9.3 update install, have been handed a welcome fix to the troublesome issue.

If you recall, the 9.3 update had left older versions of the iPad and iPhone locked, as they needed the original ID and password to continue using them, and as some users might not necessarily remember those details, they were left with weighty, but useless, devices. Apple's solution was to release a new version of iOS 9.3 as it isn't really good form to leave your customers in a state of flux (the initial workaround was to connect to their devices via iTunes on a computer).

It's also worth noting that some users have since complained about the update to the update (it you get what we mean) noting that some Safari links don't work any more. Yikes!

Have you upgraded to Windows 10 yet? I resisted for a long time, until I was sure that all my peripherals and software would actually work. And since installing the operating system, I have to say I've been perfectly happy with it. A few things aren't where they used to be, but a short period of adjustment is all that's needed.

If you're still using Windows 7 or 8, though, then you'll no doubt have grown accustomed to Microsoft's constant nagging to upgrade. You might even have found your PC has been downloading the files for the upgrade without your permission.

As competent as Windows 10 is, such tactics are deplorable. Those who purchased the earlier operating systems should be able to decide whether or not they want to change to a different product.

Microsoft might think the hassle it's causing is worth it in the long run, but what it doesn't seem to understand is that no company is invincible, and annoying your customers isnt actually a good long-term plan.

Anthony

Editor

Late Film Rental Leads To Arrest

The bigger question is: 'why would anyone rent this?'

In only registering an 11% rating on film review aggregator Rotten Tomatoes, Feddy Got Fingered has been variously described as "87 awful minutes" an "abomination" and "brutally awful". In short, then, it is considered one of the worst films of all time.

So why, then, has a US man ended up getting himself arrested over renting this truly dreadful movie? James Meyers was initially pulled over by police officers when one of his car lights wasn't working correctly. The officer looked him up and it transpired that there was also a warrant for his arrest, pertaining to the renting of the 'comedy' from a video rental store from 2002. As he still hadn't returned the video, the arrest stood and he faces a $200 fine over the case, a fine which the star of the movie, Tom Green, has since tweeted he'll be happy to pay should it come to that.

> "It is considered one of the worst films of all time"

Come on guys, this is all a bit harsh, isn't it? Let's say we forget the fine; the black mark against Meyers' name just for renting the film in the first place is enough!

Meanwhile... On The Internet...

As the inimitable Wham! once sang, "one bitten and twice shy..." Sage advice indeed.

It's a common aphorism that Microsoft should take more note of, we'd suggest. Especially when it comes to its once bitten chatbot Tay. However, the engineers behind the easily influenced Twitter-dwelling loose cannon are cleary not fans of Messrs Michael and Ridgley's smooth pop stylings. Already the victim of some of the more trollish parts of social media (**tinyurl.com/MMnet08a**), Tay's first attempt at interacting with millennials infamously lasted less than 24 hours (**tinyurl.com/MMnet08b**). Its second was even shorter (**tinyurl.com/MMnet08c**).

Tay's re-emergence on Twitter was apparently a mistake, at least according to Microsoft (**tinyurl.com/MMnet08d**), which is still working on the technology that drives the chatbot behind the scenes. It published a statement telling interested parties that "as part of testing, she was inadvertently activated on Twitter for a brief period of time."

Indeed, the rather haphazard and out-of-control nature of its shortlived second stint hints that it was nowhere near ready to get up off the bench. After spewing out a tweet referencing drugs, Tay immediately took to spamming hundreds of thousands of Twitter accounts with the same message, "You are too fast, please take a rest". This appears to be a stock phrase Tay uses to deal with being overloaded with multiple messages from the same user, so the behaviour – characterised as a 'breakdown' in some parts of the press – is (as posited by *The Verge*) potentially symptomatic of Tay coming back online and being bombarded with all the messages and mentions it has garnered while offline. Whatever caused it, it's another embarrassing outing, no doubt.

It's also another thing that makes us very nervous at the idea of Microsoft rolling out its bot technology to developers (**tinyurl.com/MMnet08e**) as part of last week's Build 2016 event (**tinyurl.com/MMnet08f**).

Talking of things conceived with the best intentions going wrong, we come to the events of April Fool's day 2016. While there were some (**tinyurl.com/MMnet08g**) decent (**tinyurl.com/MMnet08h**) efforts out there, there were also some not-so-good ones (**tinyurl.com/MMnet08i**). The prize for unequivocal fail of the day, though, goes to Google Mail's Mic Drop button (**tinyurl.com/MMnet08j**).

It must have seemed like a great idea, an extra button at the end of an email that posted a sign-off GIF and blocked any further replies from the conversation thread (like, y'know, dropping the mic and walking off). It wasn't, though – as people quickly realised (**tinyurl.com/MMnet08kj**) when the complaints on social media quickly started to stack up (**tinyurl.com/MMnet08lk**).

As Google succinctly put it on its own Gmail blog, "Well, it looks like we pranked ourselves this year..." (**tinyurl.com/MMnet08ml**).

Last week, Reddit published its now-annual Transparency Report (**tinyurl.com/MMnet08nm**). Despite only indicating two requests for information emanating from the UK (neither of which the site saw as being necessary to fulfil), it still highlighted some interesting phenomena in the light of the impending UK IP Bill (**tinyurl.com/MMnet08on**) and what UK companies may be facing up to pretty soon.

The most striking thing about the report was what was *not* in it, however. The 2014 version of the summary included a section specifically pointing out that the site had not received any national security letters (**tinyurl.com/MMnet08po**) requesting user information. This year, there is no such assurance, inferring that US spies have been after information on Reddit's users and the content they're posting.

The report, it is assumed, has removed this so-called 'Warrant Canary' (y'know, like the poor birds that would keel over to warn miners about toxic gas: **tinyurl.com/MMnet08qp**), because any request issued under the US Foreign Intelligence Surveillance Act (FISA) is secret and cannot be talked about by any company receiving it or by the subject of the request. In the light of the powers proposed under our own Investigatory Powers Bill, this is a interesting reminder of what we may be letting ourselves in for.

As *Wired* points out (**tinyurl.com/MMnet08rq**), there have been over 300,000 such secret requests in the last ten years or so, very few of which anybody outside of a small circle pertaining to each is aware of. What's more, there are concerns about how these national security letters are being used by the FBI (**tinyurl.com/MMnet08sr**), as they do not require sanction from a court, and very few companies challenge them.

Twitter is, in fact, still engaged in a legal battle with the FBI for the right to publish how many of these type of requests it has received over the years. That was a fight that kicked off all the way back in 2014 (**tinyurl.com/MMnet08t**), with the social network bemoaning its inability to let it users know about the scope of surveillance under which they operate. It's not even certain that the 'Warrant Canary' approach Reddit employed will not see it fall foul of the Feds for talking about its surveillance operations... It is believed to be the first major site to explicitly 'kill' such a creature in the wild, so the lack of any legal precedent could see it end up in court anyway... Nice.

.AVWhy?

Videos For Your Eyes... Not Necessarily For Your Brain

Even though it was released on 1st April, and there was a lot of other weirdness floating around, nothing outstranged LG's ad for its new G5 handset on April Fool's Day. Chanelling Spike Jonze's brilliant *Being John Malkovich,* it sees an infinite number of Jason Stathams interacting and falling out over the new mobile phone handset. Predictably, chaos ensues, which is exactly what you'd expect (**tinyurl.com/MMnet08u**)...

QUICK BITS... The speculated 4K version of the PlayStation 4 could be announced before its VR headset lands,

Caption Competition

- This angry chap was the subject of our caption competition back in issue 1406. Here's the best of what you all came up with...

- **doctoryorkie:** "I can't believe it's not better."
- **Sawboman:** "What do you mean he battery has failed? I'll just shout louder!"
- **pesukarhu:** "Siri... You're FIRED!"
- **Ondrive:** "Budget cuts meant auditions for next year's X-Factor had to be conducted over the phone."
- **pesukarhu:** "Beta-testing the new Breath-alyzer app."
- **EdP:** "Damn you iOS 9.3 – Damn you!"
- **EdP:** "Not 'Another brick in the wall', another bricked Apple!"
- **Dwynnehugh:** "FBI Agent demands that Apple unlock 'the' phone."
- **The Duke:** "Why don't you just spelt what if type!"
- **BullStuff:** "MP communicates sympathetically with a concerned constituent."
- **BullStuff:** "How to report problems with your Broadband, to your ISP Customer Services."
- **Thomas Turnbull:** "I want a ticket for the stress relief seminar and I want it now."

Thanks for those, but the winner is Wyliecoyoteuk, with "YOU WILL UPGRADE TO WINDOWS 10, OR WE'LL SEND 'THE BOYS' ROUND TO BREAK YOUR WINDOWS!"

If you have something to say about the picture below (come on, you must have), head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**), or email us your funnies via **caption@micromart.co.uk**, remembering to add the issue number to the email.

Wireless Mice Open To Hack?

Security firm warns against several brands

Security company Bastille Networks has warned consumers using wireless mice from HP, Lenovo, Amazon and Dell that security weaknesses could lead to them being hacked.

Apparently, the way such wireless mice communicate with computers is leaving them vulnerable to attack as hackers could potentially spoof signals in order to afford them access a user's PC. The companies behind the mice have been contacted with details of the exploit, and they are apparently intending to bring out updates to secure them – at least according to reports.

Broadband Speeds Higher Than Before

Average up by 6Mb/s

The average home broadband speed in the UK has increased by 6Mb/s compared with just a year ago, we're told.

The figures have come out of regular research data from communications regulator Ofcom and the same dataset also tells us that 42% of residential fixed broadband lines was made up of superfast connections with a headline speed of 30Mb/s or more. This is a healthy 9% up on the previous year, while the percentage of broadband lines with a headline speed of up to 10Mb/s or higher has reached a decent 93%.

Predictably, average download speeds in urban areas, are over three times that in rural areas, though, with a lower availability of fibre and cable broadband in rural areas.

Snippets!

Dell IT Services Sold

Dell has sold-off its IT services business, which is now owned by Japan's NTT Data. The purchase price was, it's been reported, in the region of $3bn, with the decision to sell believed to be part of NTT's wider plan to expand into North America. It's certainly the biggest acquisition by the Japanese outfit, and for Dell the selling of this arm of its business will help to reduce some of its debt.

Yahoo For Sale

According to *The Wall Street Journal*, Yahoo has set April 11th as the deadline for initial bids for its web business and its assets in Asia.

The report cites "sources" as the basis for its report, which also goes on to tell us that the struggling web giant has sent out a letter to potential bidders detailing what information they need to provide if they're interested in taking it on.

Tokyo's Robot Staff

Now this could be seriously weird. Reuters has reported that there is a robot at Tokyo's Narita Airport that can tell you the exchange rate for any currency you need, all while looking right at you.

This robot, which goes by the name NAO, has eye movements and gestures to go with the information, and can talk in English, Japanese and Chinese. The idea behind NAO's mock human qualities is, obviously, that people will take more kindly to it, but we can't help but feel that this could be a very surreal experience for anyone actually spending any time with NAO. Consider us just a little bit sceptical, then.

"Fastest Mini-ITX Gaming PC" At Overclockers

Extreme mini PC designed by "world renowned overclocker"

You'd think that a PC system designed and built by a seasoned overclocker would be a decent system to play around with, so news of the 8Pack Asteroid should be of interest.

Ian '8Pack' Parry is pretty well-known in overclocking circles, having won a bunch of overclocking events around the world and holding various world records, and his system is billed by Overclockers UK as the fastest Mini-ITX gaming PC on the market today. Including high-performance hardware finely tuned by the UK's number one benchmarking champion, the system comes with a flight case as standard that will also hold peripherals with the PC.

As standard, the PC has an Nvidia GTX 980Ti overclocked to 1450MHz+, combined with an Intel Core i7 6700K processor overclocked over 4.7GHz. Memory weighs in at 8GB overclocked to 3866MHz and there's storage in the form of a 512GB SSD for the operating system and a 1TB SSD for files and games. Powered by a 1000W 80 Plus Titanium rated power supply, there is also a complete custom hard-line tubing watercooling loop flowing within the case.

There is one mighty drawback, though: prices start at just below £4,000. Read more at **www.overclockers.co.uk**.

Social Media Use Linked With Depression

Study shows correlation

An American study into the mental health of social media users suggests a correlation between the use of sites like Facebook and Twitter and depression. The study was carried out by the University of Pittsburgh School of Medicine and it found that the users who checked social media platforms the most often were over two and half times more likely to suffer from depression than others. Users who spent the most amount of time on social media platforms were 1.7 times more likely to be depressed.

The researchers interviewed over 1,700 adults between 19- and 32-years-old and monitored their social media user on the usual suspects – YouTube, Twitter, Facebook, Snapchat etc. The average user, they say, spent over an hour a day engrossed in such online activities.

The research concluded: "Exposure to highly idealized representations of peers on social media elicits feelings of envy and the distorted belief that others lead happier, more successful lives."

Sounds plausible to us.

QUICK BITS... Netflix has admitted to data throttling over mobile networks

GTA Deer Runs Amok

It cannot be reasoned with. It absolutely will not stop

A virtual deer has been seen wandering around the streets and hills of *Grand Theft Auto V*. An indestructible deer. That can appear in any part of the game. Brilliant.

The deer has been programmed by a user to run free, and hundreds of thousands of Twitch users have been watching the virtual animal's 'progress'. It is quite entertaining, truth be told, with the deer having found itself in the heat of gun battles a-plenty. Crucially, the mammal cannot be killed, so it can just pick itself up, dust itself off, and start wandering around all over again, teleporting itself to various random places within the GTA world (at random times) as it does so.

There are many, many more important things to be doing with your daily lives, but you could do worse than spending five minutes or so tuning into this on Twitch. As we said: oddly entertaining.

FBI Breaks Into iPhone

Apple not required

So it really didn't need Apple's help after all. Yes, the US Justice department has confirmed that the FBI has managed to unlock the iPhone belonging to the San Bernardino shooter, bringing an end to any associated legal dealings between the US government at Apple as the court order asking Apple to write software to break into its own phone has now been ditched.

The work was carried out by an independent party (specifically Isreali firm Cellebrite), which does potentially raise questions about the security of Apple's products. Not least: just how did it manage to unlock its iPhone without the maker's help? Also, should the FBI have gone down the legal route in the first place, and was Apple right to defend its position?

Certainly its statement following this latest news, that the case "should never have been brought" in the first pace is pretty clear.

Fallout 4 Receives First Add-On

Download it now

If you haven't already done so, you might want to download the first add-on for *Fallout 4*. Called *Automatron*, its available for download for the PC, PS4 and Xbox One and will cost you £8.

In *Automatron*, the Mechanist has "unleashed a horde of evil robots into the Commonwealth, including the devious Robobrain. Hunt them down and harvest their parts to build and mod your own custom robot companions."

You can choose from hundreds of mods with various weapons at your disposal, such as the all-new lightning chain gun. You can view a trailer for the add-on online and this is the first in a few upcoming releases for the game, with *Wasteland Workshop* due in April and *Far Habor* in May. For PC users, free updates like *Survival Mode* and the Creation Kit, which allows users to create mods and share them across all platforms, also sound worth looking out for.

First Oculus Rift Delivered

By hand, no less

Ross Martin in Alaska has the honour of being the first person to have pre-ordered and now received his Oculus Rift hardware.

Not only that, but the virtual reality headset was actually hand-delivered by the founder of Oculus, Palmer Luckey. Delivering the gear a few days before consumer units were due to be delivered to customers on a wider basis, Luckey told games news site Polygon "I'll be damned if some random delivery guy is going to get the satisfaction of delivering the first Rift."

The delivery was filmed and subsequently posted to Luckey's Facebook page, making Ross Martin famous. Kind of. Anyway, the virtual reality war has begun.

StarTech Dual-Bay 2.5" Hard Drive Enclosure with RAID

As a salute to the Spice Girls, StarTech embraces when two become one

DETAILS
- **Price: £88.79**
- **Manufacturer: StarTech**
- **Website: goo.gl/RaKpEo S252BU33R**
- **Requirements: USB 3.0 port, Windows XP or later, Mac OS X, Linux. 2x 2.5" SATA hard drive (HDD) or solid state drive (SSD)**
- **Part No. S252BU33R**

Anyone who's had a number of computers up to this point will have some spare items, often drives from long deceased laptops.

The S252BU33R by StarTech is a means of easily taking 2.5" SATA drives and repackaging them for reuse by a desktop system through USB.

Without any scale reference, this looks like a typical 3.5" dual drive enclosure, but at just 90mm high and 50mm, wide it's much smaller and occupies significantly less desk space.

Inside are two bays that accept any 2.5" drive, physical or SSD, in widths from 5mm to 15mm. You can place a single drive or two in there and simply connect the box to an available USB 3.0 port and a provided power adapter, and you'll have access to those volumes like they were internally mounted.

The box uses a JMicron JM5561 chip to manage the drives, and that also allows you to operate them in one of four possible combinations. You can stripe for performance (RAID 0), mirror for redundancy (RAID 1), just use them directly (JBOD) or span them so the capacities are combined into a single volume.

That last option is useful if the drives you have aren't the same size but you want a single facility with all the capacity allocated to it.

Setting these up is probably the weakest aspect of this design, because it involves having the cover off and setting dip switches while the unit is plugged in. Why StarTech didn't put the switches on the outside, I have no idea. However, once configured, I'd doubt you're likely to be altering it very often.

In my testing I used a couple of old Western Digital drives, each capable of about 115MB/s read and write, and individually that's what they delivered in this box in JBOD mode.

Under striping mode, I was able to boost that to nearly 200MB/s, an improvement certainly worth having. However, it should be noted that if your motherboard supports RAID modes, you could achieve the same by internally mounting the drives and configuring them for RAID 0 in the BIOS.

Those wondering if this will work for SSDs, the answer is emphatically 'yes', although the maximum 5Gbps bandwidth on that technology only translates into a theoretical 640MB/s. The long and short of that is that you won't be seeing a doubling of performance with two 500MB/s SSDs, unfortunately.

But the biggest problem confronting this device is the price, which is well beyond the benefits that it's likely to deliver, even if you've got many 1GB 2.5" drives to spare. For less than the cost of the S252BU33R, you can buy a WD Elements Desktop 3TB external drive, and that comes with a 3.5" 3TB drive pre-installed. Or for just a few pounds more you can get you can get a 480GB SanDisk SSD Plus with a cheap USB 3.0 enclosure that would outperform any physical drives in whatever RAID mode.

On that basis, you need to be very convinced that this makes economic sense to you, before splashing out.

mm Mark Pickavance

External RAID enclosure for spare laptop drives

Seagate 8TB NAS Hard Drive

Running low on NAS drive space? Not any more

DETAILS
- **Price: ~£260**
- **Manufacturer: Seagate**
- **Website: goo.gl/O3RP9c**
- **Requirements: NAS with SATA-3 connection for best results**

The recently released Seagate 8TB NAS optimised hard drive is one of the largest capacity drives we've ever tested. Just stop a moment to think about it. 8TB: that's a ridiculously huge amount of space on a single drive.

Of course, business users will be accustomed to such large capacities, but the home user generally has just a few terabytes to play around with in their current NAS setup. The introduction of a pair of 8TB drives will certainly keep even the most prolific downloader happy for some time to come.

The current selection of Seagate NAS drives come in a variety of capacities: 1TB, 2TB, 3TB, 4TB, 5TB, 6TB and, of course, 8TB. They're specially designed for NAS duties, with customised error recovery technology, improved power management, vibration tolerance for optimal performance and a higher degree of reliability and stability than you'd find in a 'normal' hard drive.

The Seagate NAS drives also include a customised and advanced firmware called NASWorks. The technology behind NASWorks is designed to help improve the overall performance of a multi-drive NAS unit. The aforementioned error control and improved power management are a couple of features of this firmware, but that also coincides with the vibration control through the use of a dual-plane balance – which cuts down significant vibration across multiple drives when they're all spinning together.

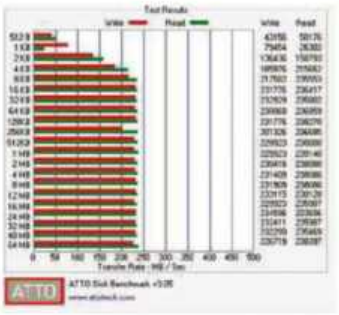
Seagate has gone to great lengths to test the new NAS drives in several popular NAS units. Big names such as Buffalo, D-Link, Netgear, Synology and QNAP are all tried and tested with the drives.

The 8TB model features a 256MB cache with a fast 7200rpm speed for a possible sustained rate of 216MB/s. Power consumption is 9W for the average operating use, dropping to 7.2W when idling and to a further 0.6W when in standby/sleep mode.

In terms of performance, the 8TB NAs drive performs well.

The Seagate 8TB NAS hard drive is reliable, with plenty of enterprise features

> **"A superb addition to both home and small office NAS solutions"**



It's remarkably quick, and is perfect for home and SOHO users

The ATTO benchmark we ran returned a read speed of 215MB/s and a write speed of 185MB/s in the 4KB test. The 8MB test saw a read speed of 238MB/s and a write speed of 231MB/s.

The bigger 64MB test was quite impressive too, with a read speed of 238MB/s again and an improved write speed of 226MB/s. Overall, the 8TB NAS drive is no slouch.

For around £260, the Seagate 8TB NAS hard drive is a superb addition to both home and small office NAS solutions. The capacity is big enough to last for months, if not years. It's quick and has enough business enterprise features to keep your data safe.

mm David Hayward

Reliable hard drive with enormous capacity

Asus B150i Pro Gaming Aura

System builders will be attracted moth-like to the Aura of the Asus B150i Pro

DETAILS
- **Price: £92.09 RRP**
- **Manufacturer: Asus**
- **Website: www.asus.com/uk/**
- **Requirements: Skylake LGA 1151 processor, DDR4 memory**

Unless you're determined to get an overclockable Skylake CPU and need a Z170 chipset to tweak it, Intel has a wide selection of alternative platforms for its latest processors. Of these, the B150 offers an interesting combination of performance and pricing, which is why Asus placed it in its diminutive but punchy Asus B150I Pro Gaming Aura.

The B150 doesn't overclock or allow for voltage adjustment, and it has just six USB 3.0 ports and only eight PCIe lanes – enough for a single x16 PCIe. If you're building a full size system, then the PCIe limitations might put you off, but with a tiny media-centre-centric platform like the B150i Pro Gaming, PCIe lane limits are almost irrelevant.

I've seen smaller boards on Intel's NUC systems, but the mini-ITX platform this motherboard uses is as small as you could reasonably get and mount a socketed LGA 1151 processor and DDR4 288-pin DIMM modules. However, things are very snug indeed, with a clearance of about 1mm between the stock Intel cooler and the first memory module.

That said, Asus has shoehorned in a x16 PCIe slot for discrete graphics, four SATA ports, a USB 3.0 header, dual DDR4 slots and three fan headers.

The I/O shield area includes four USB ports (equally divided between 3.0 and 2.0), a Type-C port (USB 3.1 Gen 1), HDMI, DVI, six audio jacks, optical S/PDIF and a combined PS/2 keyboard and mouse port.

On my first inspection, I assumed there wasn't enough room for a M.2 module, but Asus was sneaky here and placed it on the underside of the board. The only snag this, other than the obvious access issue, is that the B150 chipset isn't awash with PCIe lanes, having just eight available to share between all the I/O.

Asus insists that the M.2 has four lanes allocated to it, but I'm not sure if those numbers entirely add up. That said, a high-end M.2 PCIe module used in this slot will still go more than twice the speed of any SATA SSD ever made, so it's largely a moot point.

Another curiosity is the visual tweaks that the 'Aura' series boards bring to the gaming part. In this design the underside of the board is illuminated by ten RGB LEDs that cycle through a rainbow colour spectrum, providing a degree of visual allure. Asus provides a software control tool to allow you to control the colours and cycle patterns, should you have a clear panel enclosure for presenting the effects. You can even make it flash along with music, should that rock your boat. However, this does assume that you'll find a case that is either transparent or has at least one clear side in it.

Benchmarking demonstrated well that the B150i is close to what you might reasonably expect from a full ATX board using the same chipset. Those numbers are less than 5% different from a Z170 board using precisely the same CPU and memory, underlining the amount of technology the various chipsets share.

While many people are drawn to the Z170, had Asus put one on this board, it would be largely underutilised, because there isn't any room for more PCIe slots, extra SATA ports or the like.

My only concern is that if you're prepared to use the micro-ATX form factor, you can get an equivalent board for £25 less than this price. And if you accept H110 chipset, you can have this form factor for about £60. It might not be as pretty as this one, but that extra money saved might fund a faster processor or better/more memory.

Also, if you're going to use discrete graphics, then you'll end up with this tiny motherboard in a micro-ATX case to give sufficient room to the video card and the PSU to drive it. In that scenario, the extra cost of this mini-ITX is a waste, and you'd be better off going with an micro-ATX Asus B150M-A design or similar.

For those who want to build something very compact yet implausibly powerful and spectacular looking, then Asus has delivered something special with its B150i Pro Gaming Aura, but I accept that market is somewhat niche.

I should mention that there's also a wi-fi version of this design with 802.11ac wireless networking hardware pre-installed.

Just make sure you're looking specifically to build a very small system before heading down this path, because that's much of what you're paying for here.

mm Mark Pickavance

Tiny Skylake motherboard for small system builders

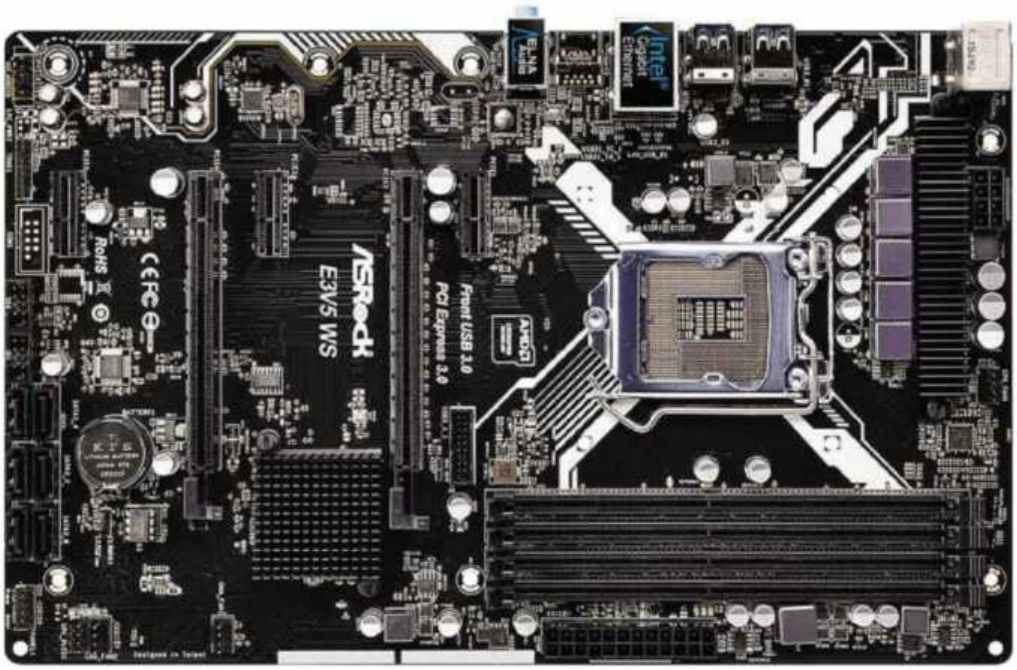
Key Features

- LGA1151 socket for sixth-generation Intel Core i7 / Core i5 / Core i3, Pentium and Celeron processors.
- Intel B150 Express chipset.
- Dual-channel DDR4 2133 support.
- SupremeFX Audio.
- Sonic Radar II.
- Intel gigabit Ethernet and LANGuard.
- RAMCache – uses system ram for high speed cache.
- M.2 PCIe slot.

ASRock E3V5 WS

ASRock supports the new Skylake Xeon chips with this board

DETAILS
- **Price: £99.53 (LambdaTek)**
- **Manufacturer: ASRock**
- **Website: www.asrock.com**
- **Requirements: Window 2008 or later, Intel Xeon E3-1200 v5 processor or sixth-gen Intel Core processors (Socket 1151)**



Those interested joining Intel's Skylake adventure will undoubtedly be aware of the Z170, B150 and four other chipsets that stratify this market. Surely, with six chipsets to choose from, there should be one for every possible market slice?

As proven by the ASRock E3V5 WS and its Intel C232 chipset, not necessarily. In addition to the consumer-level chipsets, Intel decided to throw in two additional ones specifically for workstation use: the C236 and C232. These are, in many respects, equivalent to the Z170 and B150 in the general purpose range, and boards using them are priced accordingly.

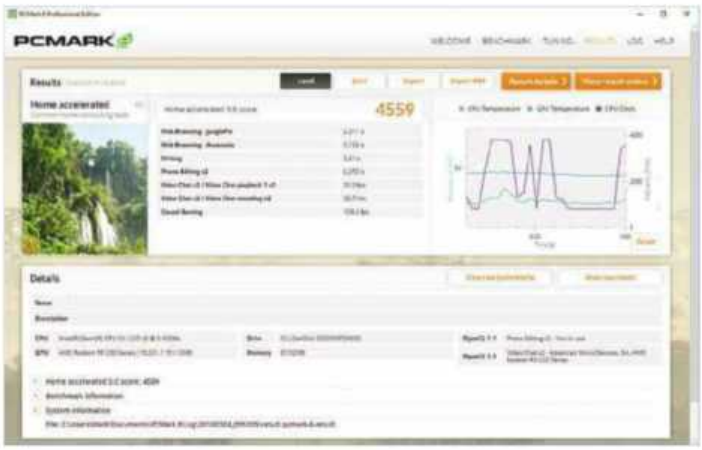
ASRock's E3V5 WS uses the C232 chipset, so it has eight PCIe lanes like the B150 offers, but somewhat curiously, the number of USB 2.0 ports has been cut from 12 to just six. There are still six USB 3.0 ports, so that's hardly a major restriction. And to balance those losses there are some interesting gains for this platform too.

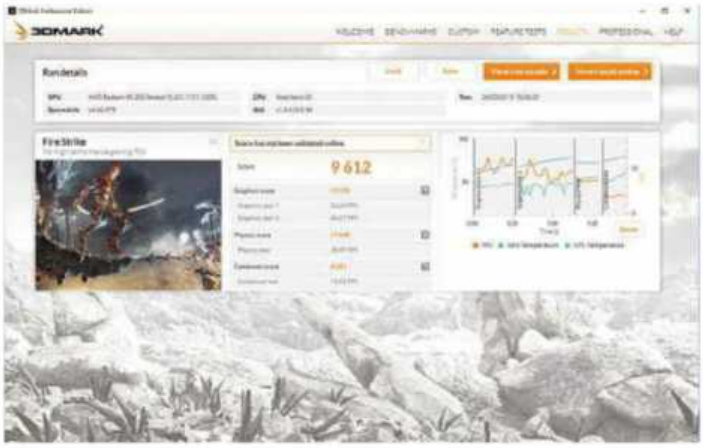
The C232 has Intel's RAID modes that you only normally get on the Z170, as well as Trusted Execution Technology. The ability to use the CPU PCIe lanes is much more flexible than the lower-tier consumer chipsets. Where the B150 can only use the 16 PCIe SPU lanes in a single x16 slot, on the C232 they can be 1x16, 2x8 or 1x8+2x4, like the Z170 and Q170 both allow.

But there's also one other specialist job it shares with its C236 brother, and that's the ability to handle the latest Xeon-class Skylake-DT processors.

ASRock very kindly included a sample of the new Intel 3.4GHz Skylake-DT Xeon E3-1230 v5 quad-core server CPU to test the E3V5 WS with, and a very interesting chip it is. The base clock turbo boosts to 3.8GHz, it has an 8MB cache, and it consumes a maximum of 80 watts, all for about £230 retail. That's less than the 3.4GHz Core i7 6700, but that chip does turbo to 4GHz.

Key Features
- Server-Grade LAN chip support.
- ASRock Super Alloy.
- Supports the Intel Xeon E3-1200 v5 processor and sixth-generation Intel Core Processors(Socket 1151).
- Supports DDR4 2133 and ECC UDIMM modules.
- 2 PCIe 3.0 x16, 3 PCIe 3.0 x1.
- Supports AMD quad CrossFireX.
- 7.1-channel HD audio (Realtek ALC892 audio codec), ELNA audio caps.
- Six SATA-3.
- Six USB 3.0 (two front, four rear).
- Supports full spike protection, ASRock Live Update and app shop





> **Some things make me wonder if the drive simplicity has been taken too far**

What that hints at is the true purpose of the E3V5 WS and the Skylake Xeon processors: to provide a solid high-performance platform that will operate for long periods comfortably.

Supporting that objective, ASRock has designed this board ignoring much of the paraphernalia you might see on a Z170 or B150 gaming platform. Gone are the overly elaborate chip coolers, LEDs and overclocking options; this is all about workstation functionality and running the computing marathon, not a sprint.

You can use non-ECC DDR4 on this platform, but it's built for ECC-compliant modules, delivering even greater stability.

Testing this platform on both PCMark08 and 3DMark Fire Strike using an AMD R9 290, I got some of the best scores I've seen. The system absolutely storms and is way better than a stock consumer Skylake of the same clock speed.

While these numbers solidified my support for the paired-down ethos, some things make me wonder if the drive simplicity has been taken too far in a few respects. The first obvious casualty is the processor's built-in GPU, because there are no video outputs on this board. Logically, that's because the GPU on the Xeon silicon has been disabled, presumably to make it run cooler. Consumer Skylake CPUs might have the GPU, but there isn't any way to access a display, therefore necessitating a discrete video card.

Along with video, the other missing item is an M.2 PCIe slot, common on many consumer chipset designs. Its omission forces anyone who wants to use this extreme performance enhancement to sacrifice some PCIe lanes for a third-party PCIe M.2 card. Those who instead go with the almost identically priced ASRock Z170 Pro4 get that feature but can't run the Xeon CPU.

And that's the rub really, because while the E3V5 WS can run any of the new LGA 1151 Skylake processors, including all the Core, Pentium and Celeron versions, it's only real purpose is the leverage the C232 chipset and support a Xeon Skylake-DT chips.

For whatever limitations it might have, the E3V5 WS does what even the Z170 can't, should you be looking to build a workstation and not just any ordinary PC. With the relatively small market for workstations, I'm rather surprised that the E3V5 MW doesn't cost more, and that's a small blessing to those who'd like to mount a Xeon in their system.

mm Mark Pickavance

Workstation class motherboard for Xeon-branded processors

HP LaserJet Pro M501n

An interesting laser printer, with some great new features

DETAILS
- **Price: £297**
- **Manufacturer: HP**
- **Website: goo.gl/k84h8R**
- **Requirements: Windows Vista or later, Mac OS X 10.7 or later, Linux Ubuntu 10.04 or later, SUSE, Fedora, Mint. iOS, Android, Windows phone supported**

The LaserJet Pro M501n is part of HP's newest range of M5-series printers for businesses, workgroups and small offices. It has a small footprint, measuring just 418 x 376 x 289mm, and it weighs a tad over 11kg. It has a 1.5GHz processor, backed up with 256MB of memory, a duty cycle of up to 100,000 pages and a recommended monthly page volume from 1,500 up to 6,000 pages.

As for connectivity, the LaserJet Pro M501 features a gigabit Ethernet port, a USB 2.0 port and a secondary USB type-B port. It also features HP ePrint, Apple AirPrint and Mopria Print Service support, via HP's embedded JetAdmin web service.

The web service also improves the management of the printer, with the ability to view the supplies status, adjust the printer settings and access up-to-date troubleshooting guides and advice.

There's an additional networking benefit to the M501 too in the form of the HP Pro security feature. With this you can define and configure which clients and devices are allowed access to the printer and its features.

The new HP LaserJet Pro M501n, with advanced printing technology

The secure printing features make this an ideal printer for many different organisations

You can even tweak the ports and IP addresses that have access to any of the printer features. Also, you can use PIN security printing through the USB port, as well as the usual job storage modes.

Despite the M501's compact dimensions, it manages to pack in a 550-page main cassette, as well as a flip-down 100-page multipurpose tray. There's a fairly basic, but adequate, two-line LCD control panel to one side, with a numeric keypad, menu navigation buttons and a few extra buttons to handle networking printing. Around the back of the printer, there's a 250-page output tray, and the front section can be lowered, as with most HP laser models, to gain access to the toner. Interestingly, the M501 features HP's new Auto Seal removal, so you'll never need to pull the tabs and remove the seal from a toner again.

The print quality is really very good. HP has introduced new toner technology since last year, resulting in a smaller toner but with more capacity for the toner powder. The print gauge technology also monitors the effectiveness of the toner over its lifespan, so you'll always get the best possible results even when the prints are beginning to fade – thankfully no more removing the toner and giving it a shake to squeeze out a few more pages.

Printing speeds are also dramatically improved, with the first page coming out around seven seconds from powering the printer up and a continual average of around 40-pages per minute thereafter.

The result of the new toner technology is a more effective printer, as well as a more environmentally friendly product. When you also factor in an improved power saving mode, the Jet Intelligence toner technology and limited packaging, HP certainly appears to be much greener these days.

At roughly £300, the price isn't bad, considering what you get for your money. It's certainly worth checking out if you're in the market for a new office printer.

mm David Hayward

An excellent workgroup laser printer

Magix Video Sound Cleaning Lab

Improve your video productions with this handy tool

DETAILS
- **Price: £34.99**
- **Manufacturer: Magix**
- **Website: www.magix.com/uk**
- **Requirements: 1GHz processor, 1GB of RAM, 1GB disk space, Windows Vista or later**

The auto options allow you to flick between the original and the result

All the cleaning filters have presets to suit a wide range of situations

I think it's fair to say that the video quality output from modern video cameras is excellent, particularly if you have one of the new 4K variety. However, the same cannot be said for the sound quality, which hasn't changed much in the last five years. Unless you use an external microphone fitted with a wind shield and one that's also capable of extraneous noise cancellation, the sound you get will in most cases be pretty abysmal. Of course, most video editing systems are capable of rudimentary audio editing to correct that, but this latest product from Magix addresses the problem with tools specifically designed for the job.

In fact, the Video Sound Cleaning Lab goes a lot further than simply fixing the sound quality; it includes facilities for mastering new tracks, importing and combining sound files from different sources or adding a commentary. The interface is clean and typical of Magix products. In fact, if you have one of Magix's video editors, you'll find the operation and command structures very similar. You can also import your video projects directly into the program from some of these editors. Here you have the option of importing the complete video file or just the audio portion. In either case, the display shows the audio as a waveform, with an expanded section at the top where you can navigate through the current clip. If you imported the video as well, you'll see a preview of the currently selected frame in the lower-right corner of the screen.

There are basically four operations to each project: import, cleaning, mastering and export. These are depicted by four large buttons on the left-hand side of the screen, with the centre section showing the appropriate tools, dependent on the operation selected. I suppose in most cases your workflow will be concentrated around the cleaning section, which is quite sophisticated and very comprehensive. Having said that, Magix is aware that not many of us are experts in this field, so there are auto options for most tasks, and these work very well. If, on the other hand, you want to become more involved, you simply have to click on the small gear icon below each filter, which in turn opens the appropriate options panel for that particular filter. Most of these also have presets to choose from so, for example, the DeNoise presets include city noise, camera noise, rumble, hum, interference and wind. If you want to delve even deeper, you'll find all these presets are fully customisable.

I tested this out on some video I took with my Sony bridge camera, which produces excellent video, but when I extend the zoom lens you can hear the whirring noise produced by the lens motor. I managed to remove most of it using the De-Noise filter and was surprised to find a filter for my specific camera. In fact, I could have removed it all, but I felt that doing so degraded the sound quality a little. And, to be fair, it was barely perceptible afterwards anyway.

The mastering section allows you to enhance the existing sound with further optimisation, and it offers the facility to add special effects. Then finally you can export the results using the same options for importing, meaning the complete file or just the audio.

Like a lot of the latest products from Magix, the Video Sound Cleaning Lab is also optimised for touchscreens. If you want give it a try, Magix offers a 14-day trial version on its website, and there's also a video tutorial to get you started.

mm Joe Lavery

A decent app designed to improve your video productions

GROUP TEST

Routers

As the entry point and control medium for your entire network, the router is probably one of the most important technology buys there is.

Routers supplied by ISPs do the job okay, but they can never compete with what's available if you're willing to spend some money. Improved network speeds, internet speeds, features and ports are what you'll get with a better router.

We have six to look at this week, and we'll try to see what's best for the average user.

Asus RT-AC68U

DETAILS
- **Price: £135**
- **Manufacturer: Asus**
- **Website: goo.gl/SQ6ajm**
- **Requirements: OS independent, any modern browser, existing ADSL modem required for internet access**

The Asus range of networking kit has improved greatly over the last couple of years, especially the range of routers it has available.

The Asus RT-AC68U measures 310 x 160 x 83mm and is a vertically positioned dual-band router with three large antennas protruding from the top. Around the back of the unit there are four gigabit Ethernet LAN ports, a single gigabit Ethernet WAN port, front LED on/off, a single USB 3.0 port and next to it a more traditional USB 2.0 port. You'll also find the power socket and power button in the bottom corner, and around the sides are WPS and wireless on/off buttons.

The front of the router sees a series of blue LEDs indicating the status of the various connections and data activity across the LAN and WAN ports, as well as the wireless status.

As for design, the RT-AC68U has been described as an aggressive looking unit, and it's not too surprising to see why. With the antennas spread out above and the sheer size of the router bearing down, it's quite an ominous addition to otherwise more friendly looking technology in the living room.

Looks aside, the RT-AC68U is an impressive performer. Theoretical dual-band speeds of 600Mbps and 1300Mbps make for a combined 1900Mbps data rate. These numbers are all thanks to the Broadcom BCM4709 processor inside the router, along with its TurboQAM technology, which greatly improves the speeds and throughput of the older 2.4GHz band. In addition to this, the RT-AC68U's dual-core ARM-based Cortex A9 processor and 256MB of memory certainly go a long way toward creating a more impressive network traffic management router.

Unfortunately, to enjoy these speeds to their full potential you'll need to connect a compatible TurboQAM device, otherwise like the rest of us, you're left with the pretty much the same throughput speeds as you'd normally see with any other router. Saying that, we experienced a far better range of wireless connection, and the media viewing we tried, via DLNA, was superb and without fault, even when we had several devices all watching the same content.

In terms of the administration software, it was clear and good enough for most users to get to grips with. There are some sections that would require a little more knowledge about networking in general, but the built-in help function is good enough to talk you through the basics, and there are some excellent extras in the form of a network map and clear icons to help set up a hard drive to one of the USB ports.

On the whole, the Asus RT-AC68U is an excellent router. The addition of USB 3.0 certainly speeds things up, as do the impressive internals and processing power.

The Asus RT-AC68U is an extremely capable router

With decent internals, it performs well too

Netgear DGND3700 N600

DETAILS
- Price: £90
- Manufacturer: Netgear
- Website: goo.gl/3BkFWb
- Requirements: Modern browser, ADSL broadband service

Although it's fairly businesslike in its looks, the Netgear DGND3700 offers good dual-band technology

Hardware is good, but the software is a little cluttered and confusing at times

The Netgear DGND3700 N600 is an older modem and router, which offers 'One less box', according to the product blurb. It's an upright router, measuring 223 x 153 x 31mm, and featuring dual-band 5GHz and 2.4GHz technology with N600 and a theoretical combined bandwidth of 600Mbps (300Mbps + 300Mbps).

Around the back of the unit is where all the action takes place. There are four gigabit Ethernet ports, a single gigabit Ethernet WAN port for connection to an external DSL modem or cable equipment, a single USB 2.0 port, power socket and a power button, plus there's an integrated ADSL2+ modem. The front of the router is slightly less packed, with a WPS button, another single USB 2.0 port and a row of LEDs indicating the various connections, ports and so on.

Inside the router are the antennas for the dual-band wi-fi, 128MB of flash memory and a further 128MB of memory for processing the data packets and streamlining the router operations.

In terms of design, the DGND3700 won't win any prizes. It looks more like a commercial product as opposed to a router that's destined for the home. It's a decently constructed unit, but the stand doesn't feel particularly sturdy, and we're not sure how much it could take if the router was moved around frequently or knocked daily.

The included software is very commercial in its appearance, wording and available features. There are also some business features too, with items such as multiple SSIDs across each band like you might see in a hotel, and a traffic meter function that will issue warnings if a pre-configured connected device goes beyond a set number of megabytes.

Generally these are options that most home users will never even look at, let alone actually use. Being able to limit the bandwidth of certain devices sounds a like great idea, and it's for business users, but for home users it's a little unnecessary.

> "The only problem we have is the level of expertise this router is designed for"

Also, the administration page and menus are confusing, as are the explanations and documentation. To the knowledgeable users, every aspect of the admin page probably makes perfect sense, but to the rest of us, it's not particularly fluid or easy to understand.

Naturally, the addition of the built-in ADSL modem is a pretty good selling point. Even if you don't want to use that function, the WAN port will connect to your existing kit easily enough. Moreover, the dual-band gigabit ports and two USB ports add more tantalising features and, in a way, so do the more commercial options and features within the router's capabilities. The only problem we have is the level of expertise this router is designed for. It's fine taking the business layer software and using it in home hardware, but you have to make sure it's aimed at home users enough to warrant the use of the extra features.

ZyXEL NBG6503 AC750 Dual-Band Wireless Router

DETAILS
- **Price: £50**
- **Manufacturer: ZyXEL**
- **Website: goo.gl/vhxbZB**
- **Requirements: Any modern browser, DSL modem needed for internet access**

The ZyXEL NBG6503 is beginning to look its age

The lack of gigabit Ethernet could be an problem for many users

The NGB6503 Simultaneous Dual-Band Wireless AC750 Home Router is ZyXEL's is designed for high-performance home networking and medium-sized business users.

Although this is a slightly older ZyXEL unit, the u802.11ac technology still manages to shift data around the network at speeds of up to 750Mbps, while allowing tablets and other smart devices to access content without having to compete for bandwidth.

If you're not familiar with dual-band kit, the concept is easy enough to understand. The 2.4GHz band is used as per normal, for casual web browsing and file transfers, with the less congested 5GHz band for more bandwidth-hungry applications. However, the 802.11ac technology means that packets can be transmitted concurrently on both bands, which will ultimately provide a huge boost in wireless performance and stability.

In the box, we have the router itself, the detachable antennas (one for 2.4GHz only, the other for 2.4/5GHz), power with an additional European plug fitting, an Ethernet cable and the support CD, along with the various quick start guides and other paper-based documentation. Setting the router up is a simple enough affair, involving just a four-step process of plugging everything in, then accessing the router to finalise the process by providing the details that your ISP gave you. Alternatively, you could simply use this as the main wireless router via your current setup.

As the NBG6503 is an older model, it has four 100Mbps Ethernet ports to the rear, along with a single 100Mbps WAN port, instead of gigabit connectivity. A power switch, power connector, a reset pin hole and a WLAN on/off switch finish off the rest of the rear features.

It's remarkably small, considering what's packed inside, and comes in a stylish piano-black finish. Although style is unimportant, compared to technical specifications, to some degree, ZyXEL has done a very good job in creating a device that won't look too out of place with the other hardware you own.

Connection to wireless devices can be achieved in either the normal way via the device itself or by the one-touch WPS button. Once connected, the router will automatically utilise the necessary band for your device.

Everything else thereafter occurs automatically, without any need for you to manually switch bands. In the tests we ran, on a home network, there was no noticeable drop in connectivity when we bombarded it with multiple instances of streamed full HD content, gaming and other multimedia applications. Every device seamlessly switched bands, and the result was a far less congested network with a much improved and stable bandwidth backbone.

Obviously, gigabit Ethernet would have been a great benefit for those with faster home network setups. Also, a USB port or two wouldn't go amiss either, and a more detailed firewall setting in the Expert mode would have been a good addition too. It's a good router, but it's sadly looking its age these days.

ZyXEL NBG6716 Media Router

DETAILS
- Price: £90
- Manufacturer: ZyXEL
- Website: goo.gl/1OT70W
- Requirements: Any modern browser, DSL internet modem needed

This is the second ZyXEL product in this group, but rather than a simple upgrade to the previous model, ZyXEL has opted to go all out with a complete all-in-one media setup.

The ZyXEL NBG6716 Media Router is a stylish-looking unit, standing quite tall on a solid base and offering a nice glossy black finish with the standard ZyXEL ribbed touch and silver logo. There's a WPS key located in the top corner, with a cluster of clear LEDs, which can be dimmed. Along one side, you'll find a couple of USB ports, along with their accompanying eject buttons. The other side features a couple of push button switches: one to enable the wi-fi and the other to dim the LEDs. Around the back of the NBG6716, you'll find four gigabit Ethernet ports, a gigabit WAN port for connection to your DSL/cable modem, a power switch and socket and the pin-hole reset.

Getting the NBG6716 up and running is an absolute breeze, and to help you out there's the usual quick start guide, along with all the necessary cables in the box. Once up, you can load the web-based admin portal and access all aspects of the router side of things, as well as the NAS media sharing functionality through the USB ports, DHCP, energy saving and the various security settings.

The ZyXEL NBG6716 Media Router has plenty of appeal

The technology used is great, but VDSL would be handy

This ZyXEL router is quite impressive, to say the least. You get simultaneous dual-band wireless, with 2.4GHz for standard web browsing and 5GHz for delivering full HD media streaming; a specialised Smart QoS called StreamBoost that has been designed to provide the best data throughput for optimised multi-stream HD video, gaming and IP voice services; an impressive web-admin layer; content filters; a firewall and many other elements.

Even when used as an access point, as opposed to an active home network router, the NBG6716 shines. This is a powerful device and one that will keep enthusiasts and those with a need to have the fastest and best networking equipment happy for a long time to come. It easily ticks every box and combines the many award winning technologies that ZyXEL products employ.

The only potential real-world problems we came across were its size and placement, in that it's rather tall and a little awkward to place if you're limited to space. And if you're wall mounting it, the feet from the base make the unit stick out from the wall.

We were significantly taken by the NBG6716 and all its capabilities.

If you're in the market for a new router, DLNA server and fast wi-fi/Ethernet switch, then the NBG6716 could be the one for you.

Netgear Nighthawk X4S

DETAILS
- Price: £285
- Manufacturer: Netgear
- Website: goo.gl/wxHRbT
- Requirements: Any modern browser, VDSL broadband for best results

Labelled as the Batman of routers, the Netgear Nighthawk is certainly an imposing device

It's horribly expensive, but it does pretty much everything you can think of

With a name like Nighthawk, it's hardly surprising this Netgear product has received a fair amount of attention.

As you can assume from the name, the Nighthawk is a specially designed high-end router for fast network setups, plus it also features a VDSL2 built-in modem so you can effectively get rid of the other ISP kit.

It's built with gaming, streaming and mobile devices in mind. It features a 1.4GHz dual-core processor, along with 128MB or flash memory and a further 512MB of main memory. Connectivity consists of four gigabit Ethernet ports with a further single gigabit Ethernet WAN port, an eSATA port to one side and a pair of USB 3.0 ports on the opposite side. The last element is the DSL port, which supports VDSL, VDSL2, ADSL, ADSL2 and ADSL2+.

The main design features are the four dominating antennas, two which protrude from the rear of the unit and two from either side. Other than that, it's a sleek wedge-shaped device with plenty of cooling vents along the bottom and sides. There's little wonder it's been described as the Batman of routers.

The performance of the Nighthawk X4S is quite impressive too, with speeds of up to 1,733Mbps from the 5GHz channel and up to 800Mbps from the 2.4GHz channel. The Nighthawk also incorporates Wave 2 MU-MIMO technology, which can improve the rate of traffic between connected devices by simultaneously sending and receiving data for up to three devices. However, this function also needs to be supported by the devices you're connecting.

> **"As you would expect, a router of this calibre will cost a pretty penny or two"**

The software and setup of the Nighthawk is really very good indeed. The first run through the wizard will auto-analyse the type of connection you're hooking the Nighthawk up to, and it will advise the best possible setup, as well auto-configuring itself to the type of DSL line you have.

Further into the configuration portal can prove to be a little confusing for some users, and you could end up losing yourself in the labyrinth of menus and options. But for those users who are a little more capable with the technology, it should be relatively easy to navigate through the various options.

The Netgear Nighthawk X4S is a power user's router. Regular users who wish to just browse the web and stream video will find the extra performance and features a bit of a waste, to be honest. On the other hand, it's certainly a capable router and one that will allow you to grow your network in future.

As you would expect, a router of this calibre will cost a pretty penny or two – around £285, in fact. Yes, it's an excellent router, but it's probably overkill for the majority of users.

TP-Link Archer C9

DETAILS
- **Price: £90**
- **Manufacturer: TP-Link**
- **Website: goo.gl/I3tU2k**
- **Requirements: Any modern browser, DSL internet modem required for internet access**

According to TP-Link, the Archer C9 is one of the cheapest AC1900 routers currently available, by a good few pounds. But in spite of its low price, it's not short on features.

Connectivity comes in the form of four gigabit Ethernet ports around the rear of the unit, together with a gigabit Ethernet WAN port and USB 2.0 port. There's also a second USB port, this time of the 3.0 variety, located to one side.

Other hardware features include a WPS button, three dual-band detachable antennas and a sleek, glossy white plastic face with a row of LEDs indicating power, wi-fi and so on. It's fairly basic, but enough for the vast majority of users.

The icing on this particular cake, though, is the strong 802.11ac 5GHz and 802.11n 2.4GHz channels. With transfer rates of up to 1,300Mbps over 5GHz and 600Mbps over the 2.4GHz band, the Archer C9 can effectively keep up with the likes of the Netgear Nighthawk.

You get the usual range of software functionality with the Archer C9, such as an enhanced quality of service, bandwidth control, access control, VPN pass-through, Samba, FTP, and media and print server capabilities via the two USB ports.

As for the design, the Archer C9 is a pleasing-looking router – not something that's as aggressive-looking or business-like as some of the other products we have in the group. It's worth mentioning, however, that due to the positioning of the various ports, the Archer C9 can only be set up in the upright position; there's no option for wall mounting or laying it flat. It's not a huge design flaw, but it could potentially turn some users off.

The TP-Link Archer C9 is an effective router

It's not a bad price and it ticks all the right boxes

Since this is a router only, not a modem router, the setting up is pretty simple. TP-Link has done a great job of creating a lightweight configuration and management portal, together with a handy network map to help newer users get to grips with the layout of their home network. It's quick, easy to use, and more advanced users can easily get to the configuration elements they'd need without too much difficulty.

The TP-Link Archer C9 is a pretty solid router. It's not the fastest model we've ever tested, but it's easily better than most of the examples we have in this group. For most users, it will tick all the right boxes, especially the price.

With everything taken into consideration, the TP-Link Archer C9 is a pretty good upgrade to any ISP-supplied or older router. Its wi-fi is great, there are plenty media and sharing features and the hardware is good enough for anyone other than hardcore networking enthusiasts.

ZyXEL NBG6716 Media Router

Provided you're not after a router that has a built-in DSL modem, the ZyXEL NBG6716 Media Router is an extremely effective and quick router.

It has everything you could ask for, and there's room to grow your network with it too.

Netgear Nighthawk X4S

If money is no object or you want one-box that fits everything, then the Netgear Nighthawk X4S is the one for you.

Yes, it's extremely expensive, but it's one of the fastest routers we've ever used, and it goes above and beyond in terms of the features and extras.

How We Tested

Each router was tested by connecting a collection of wired and wireless devices: three desktop PCs, two laptops, an Android tablet, two Android phones, PlayStation 3 and smart TV. To test media capabilities, we connected a USB hard drive with several HD films to stream across the network. Each wireless device was tested to limits within a house, where the router was located in the living room at the front of the house, to a maximum of 25 metres.

	Asus RT-AC68U	Netgear DGND3700	ZyXEL NBG6503	ZyXEL NBG6716 Media Router	Netgear Nighthawk X4S	TP-Link Archer C9
Price	£135	£90	£50	£90	£285	£90
Size	220 x 83.3 x 160mm	223 x 153 x 31mm	159 x 111 x 23mm	214 x 74 x 165mm	285 x 185 x 50mm	221 x 86 x 168mm
Weight	640g	500g	230g	460g	840g	
Ports	4 x gigabit LAN, 1 x gigabit WAN, 1xUSB 2.0, 1x USB 3.0	4 x gigabit LAN, 1 x gigabit WAN, 2xUSB 2.0, 1xADSL	4 x gigabit LAN, 1 x gigabit WAN	4 x gigabit LAN, 1 x gigabit WAN, 2xUSB 2.0	4 x gigabit LAN, 1 x gigabit WAN, 2xUSB 3.0, 1xVDSL	4 x gigabit LAN, 1 x gigabit WAN, 1xUSB 2.0, 1XUSB 3.0
Antennas	3	0 – internal	2	0 – internal	4	3
DLNA	Yes	Yes	No	Yes	Yes	Yes
Remote Access	Yes	Yes	No	No	Yes	Yes
FTP Server	Yes	Yes	No	Yes	Yes	Yes
Print Server	Yes	Yes	No	Yes	Yes	Yes
Measured Wi-fi Range, Out 25m	>25m	>25m	>25m	>25m	>25m	>25m

Top 5 Point And Click Series

Who doesn't like a bit of adventure every now and then?

1 Monkey Island

Following the adventures of the swashbuckling Guybrush Threepwood, *the Monkey Island* series began in 1990 with *The Secret of Monkey Island*. Made by LucasArts, it saw you taking on the evil undead pirate LeChuck, who would be a thorn in your side all through the rest of the series. Like many of the LucasArts adventure games, it was shot through with cheeky humour, bizarre characters and tricky puzzles. And it also featured plenty of talk about grog, which is no bad thing.

More recently, Telltale Games revived the franchise with a new five-part episodic series.

2 Broken Sword

Taking on slightly more grown-up themes than other point-and-click games, the *Broken Sword* series trades in conspiracy theories and the mythology of the Knights Templar. The hero is a mild-mannered American patent lawyer by the name of George Stobart, and throughout the series, he's assisted by the tenacious French reporter Nicole 'Nico' Collard. And if you think this all sounds a lot like *The Da Vinci Code*, bear in mind it was created long before that book was written. Maybe Dan Brown was a fan?

3 The Walking Dead

Based on the same comic book series as the hit TV show, *The Walking Dead* was another one of Telltale Games' episodic releases, split again into five parts. It was hugely sucessful and has since spawned a sequel and a couple of spin-off games. Unlike other point-and-click titles, there aren't really any puzzles – just a series of choices to make and the kind of carefully crafted storylines that can actually make you care about the characters and their struggles.

4 Leisure Suit Larry

If you grew up in the 1990s and you owned an Amiga, then you might well remember playing the 1987 game *Leisure Suit Larry in the Land of the Lounge Lizards*. And if you did grow up in the 90s, then you were much too young to be playing it, because it was full of adult themes, including some pixelated nudity and plenty of puerile humour. More recent attempts to revive the franchise have fallen far short of the original, but it's still a series we remember fondly.

5 Sam & Max

Starring a couple of anthropomorphic animals things, who also happen to be private investigators, *Sam & Max Hit the Road* was another LucasArts game, and it was released in 1993. That was quite some time after its source material, a comic book series, began in 1987. The game did well enough that a sequel was commissioned, but ultimately it was cancelled. Then another sequel was greenlit, before also being ditched.

Thankfully, Telltale Games bought the rights to the series in 2005, and a few years later relaunched it in the company's now familiar episodic format.

▲ *Where it all began for the man in the white suit...*

Five Times Letting The Internet Decide Was A Bad Idea

Everything's online now, and brands and organisations are constantly being told to engage the public. Is that always a good plan, though? Sarah Dobbs finds examples when it definitely wasn't

You can connect with just about anyone – and anything – on the internet nowadays. Got a problem with your phone bill? You can tweet Vodafone, EE or whoever your provider is. Wondering when your bins are going to be collected? Check your local council website, or even, if you're lucky, follow a real-time tracker online to see what's going on. Oof course it goes without saying that pretty much any actor or popstar you care to name will be running Twitter, Instagram and Snapchat accounts, all designed at maximising 'engagement' with fans and harnessing fan momentum to promote their next project.

Most of the people you know in real life probably do a similar thing, in their own way. Who amongst us isn't guilty of posting puns to Twitter or making Facebook updates about our lives in hopes of gaining a few Likes and a bit of human interaction?

None of the other names suggested for the NERC's new research ship came close to Boaty McBoatface

None of this, incidentally, is a bad thing. For the most part, for most things, having instant access to hundreds of people all over the world is a great thing. Sometimes, it goes wrong, however.

Over the years, lots of people have discovered that the hard way. Opening up discussion and decisions to the internet community as a whole can have some pretty unexpected – and unpleasant – results. The web is a great place to get campaigns going, or to get ideas you wouldn't have thought of all by yourself, but it's also a great place for incredibly silly jokes, and some pretty horrible opinions. Time for some examples? Here are five times that asking the internet for input turned out to be a pretty terrible plan…

Boaty McBoatface

When the Natural Environment Research Council (NERC) launched a competition to name its new polar research ship (**nameourship.nerc.ac.uk**), they probably thought it'd be a fun campaign that'd maybe encourage a few more people to engage with their work than normal – after all, had you ever heard of NERC before last month? The way the site was set up, anyone could submit a suggestion for a name, and then other visitors to the site could vote for the one they liked best. It was nice and democratic, plus it encouraged people to send the link to their friends, to get them to vote for their suggestion.

> **"Faced with any choice, the internet will go for the silliest possible option"**

The problem, though, was that within 24 hours of the campaign's launch, one name had raced into the lead: Boaty McBoatface. The name was submitted by James Hand, presumably inspired by the 'Hooty McOwlface' meme – the photograph of an owl at a zoo named by a member of the public which, appropriately enough, had previously been circulated as a reason not to let random people name things.

Although there were plenty of other suggestions for the vessel, both sensible and silly ('RRS It's Bloody Cold Here', for example), Boaty McBoatface caught the imagination of the internet, and at the time of writing, it had nearly 70,000 more votes than the next most popular suggestion. The story picked up steam and soon newspapers around the world were running headlines about how a very serious research vessel was about to get a very silly name. Hand, when approached for comment,

Luckily, humpback whales don't care what they're called

apologised to the NERC and distanced himself from the mania for voting for Boaty McBoatface: "It was my suggestion," he said, "But the storm that has been created has legs of its own. It's all really good fun, but it's so surreal."

The NERC, for their part, have been good sports about it, admitting they found the whole thing kind of funny. There's a get-out clause, too, which might explain their good humour: they're under no obligation to actually christen the boat with the most popular suggestion, so they can just pick something else when the campaign ends. Still, it goes to show that faced with any kind of choice, the internet will go for the silliest possible option.

Mister Splashy Pants

Another example of much the same thing, the naming of Mister Splashy Pants really cements the idea that people on the internet won't take these kinds of campaigns seriously, ever. Back in 2007, Greenpeace opened a competition to name the humpback whales they were tracking on their migration paths. The environmentalists received around 11,000 entries, and then narrowed it down to 30 and opened a public vote. And then, well, you can guess what happened.

'Mister Splashy Pants' received a whopping 78% of the public vote, while relatively sensible names, like Humphrey, Aiko, Aurora, and Mira just got a handful of votes each. Like the Boaty McBoatface competition, there were plenty of websites urging people to go and vote; even though both Twitter and Facebook were in their infancy back then, several blogs managed to rally their readers to make sure the daftest name won the day.

Like NERC, Greenpeace accepted the decision in relatively good graces, though its blog post on the topic did point out that some websites backing 'Mister Splashy Pants' as a name were encouraging their readers to cheat by voting more than once. Maybe the fact that they had more than one whale to name helped soften the blow – or maybe the fact that people seemed to have become engaged in the campaign and thus invested in the whale's well-being made up for the silliness of the name they'd chosen.

Actually, the campaign worked pretty well, because all the attention given to Mister Splashy Pants helped Greenpeace to convince the Japanese government to drop its plans to hunt humpback whales for a season. Mister Splashy Pants might never know that the internet was giggling at his new name, but at least he'd live to swim another day.

Luckily for Bieber, this wasn't an official poll

Bieber For Korea

Moving on from naming things, then, the internet has also been asked to suggest things like tour destinations for popstars – and that, too, has gone awry when pranksters decided it'd be funny to try to game the vote. In 2010, **Faxo.com** set up an online poll relating to Justin Bieber's 'My World' tour. The poll asked respondents to vote for a country Bieber should visit next on his tour, with no restrictions. 4chan got involved, and soon the country topping the poll was North Korea.

When more than half a million votes had been cast, the poll attracted a lot of media coverage, with some sources claiming this meant Bieber would actually have to honour the poll and apply for a visa to visit the dictatorship. The BBC soon got to the bottom of things, though, explaining that Faxo wasn't actually affiliated with Bieber's management, and as such, the popstar under any obligation to do what its users said. Indeed, after checking in with the North Korean Embassy, the BBC also pointed out that it'd be highly unlikely Bieber would be given permission to enter the country, even if his management submitted an application.

Ultimately, then, this was a fairly harmless prank. Bieber's tour eventually saw him perform in America, Canada, the UK, Germany, the Netherlands, France, Belgium, Denmark, Spain, Switzerland, Italy, Israel, Singapore, Malaysia, Indonesia, Australia, the Philippines, Hong Kong, Taiwan, Japan, Mexico, and various South American countries. And, well, there've been enough stories about Bieber's antics since, that it's not worth recounting them here.

This example really just demonstrates that the internet's sense of humour isn't always silly. Sometimes, it's vindictive, especially where moppety popstars are concerned.

Taylor Swift And The Deaf School

More recently, singer-songwriter Taylor Swift fell victim to a similar sort of prank – only this time, the competition absolutely was endorsed by her management. Two years after the Bieber vote, Swift took part in a promotion titled 'Taylor Swift On Campus'. In association with textbook company Chegg and pizza joint Papa John's, Swift agreed to perform at whichever school received the most support in an online vote. Another 4chan campaign followed, and when the competition closed, the school with the highest number of votes was the Horace Mann School For The Deaf and Hard Of Hearing, in Boston.

Mega lolz, right? Sending a popstar to perform for deaf kids? It's not quite as mean-spirited as trying to send Justin Bieber off to a country known for its human rights violations, but it's still pretty cruel. Even more so when you consider the fact that the school's principal, Jeremiah Ford, was pretty keen on the

Taylor Swift ultimately decided not to sing for deaf kids

idea. While the campaign was running, he said that "There are accommodations that make music come alive for deaf people. They have different abilities. They're not disabled, they're impaired. It might have been done with mal intent, and shame on them, but what a great opportunity for us."

> **"Maybe some of the people voting out of spite read his comments and felt bad. They probably didn't, though"**

While Swift probably could have performed at the school and let the kids enjoy it – even the most impaired could've enjoyed the choreography, or she could've learned some sign language – her camp decided that because the contest had been rigged, the votes for Horace Mann should be discarded. Instead, Swift performed at the Harvey Mudd College in Claremont – but she sent a personal donation of $10,000 to Horace Mann, which might have been some consolation. Maybe some of the people voting out of spite heard this, or read the principal's comments and felt bad. They probably didn't, though.

Microsoft's Tay Goes Wrong

That brings us to the most recent example of why we shouldn't let the internet have a say on anything. Last month, Microsoft launched a new chatbot. Named Tay (**tay.ai**), the bot was targeted at young people in the US, and was meant to further Microsoft's research into artificial intelligence and conversational understanding.

Basically, Tay was like an updated version of the SmarterChild chatbot; the technology was more advanced, but the principle was roughly the same. Tay took input from conversational partners on its website and on Twitter and worked it into its repertoire, learning as it went. As Microsoft put it on the Tay website, "the more you chat with Tay the smarter she gets".

If you've read this far, that idea might make you less enthusiastic and more apprehensive. Sure enough, within hours of Tay's online debut, trolls were busily working on teaching her all kinds of hideous things. Firstly, people figured out that tweeting "repeat after me" would lead the bot to repeat

Microsoft took its chatbot offline after trolls took no time at all to teach it to spew Nazi propaganda

We'd wager that this isn't going to end well

whatever they went on to say, which made it easy to put horrifyingly racist and offensive sentiments into her 'mouth' (i.e. tweets). Worse, as Tay was programmed to learn from other users' conversational patterns, by tweeting lots of racist, sexist, and even genocidal things at her, the internet taught the bot to replicate those views.

It's worth saying at this point that a lot of the people tweeting at Tay probably didn't actually hold the views they espoused. They just thought it was edgy to make a robot say awful things. That doesn't render their actions harmless, though – as anyone from a persecuted minority could tell you, intent's not always as important as actions, and by 'hilariously' pushing offensive views onto an artificial intelligence, some users have inadvertently raised questions about their own intelligence level.

Microsoft, to its credit, soon deleted the most offensive messages – though not before plenty of screencaps had been taken – and the entire project had to be taken offline in under 24 hours, because it had gone so badly wrong.

We Never Learn

You might say that Microsoft should have known better than to launch something like Tay. After all, there have been more examples than I could list here of people doing similarly horrible things in other campaigns – remember Coca-Cola's #MakeItHappy campaign, that was flooded with quotes from Hitler's Mein Kampf? Open anything up to the public and someone's liable to find a way to subvert it, in either funny or offensive ways.

That's kind of sad... Doesn't it seem depressing that you can't even make a robot without someone trying to teach it to be anti-Semitic? What's wrong with us, as a culture, that this kind of stuff happens every time – and usually, before anyone has a chance to do anything more interesting with a campaign?

That's a question people have been asking for as long as the internet's existed, in various forms. Why do people feel the need to leave abusive comments as soon as they can do so anonymously? Why is Twitter so full of trolls? It might seem like a flaw in the internet, but more likely it's down to something more deep-seated and difficult to fix, as much as Facebook and co might reckon they can condition the nastiness out of us.

Maybe it's better to embrace the silliness, and hope that the hatred goes away. Incidentally, the US Air Force has just asked Twitter to suggest named for its newest stealth bomber, a B-21. Suggestions so far include Stealthy McHidden and Bomby McBombface. Looks like we haven't learned, yet, just how bad an idea it is to ask the internet to get involved in things… **mm**

Four Times The Internet Was A Good Thing

To counter all this negativity, here are four times people used the internet to do something kind, or nice, or thoughtful:

Postcards For Aron

There have been lots of online campaigns to send postcards and letters to lonely people. To pick a recent example, last Christmas Reddit users decided to send post to Aron Anderson, a 10-year-old who lives on a remote Scottish island and doesn't have any local friends. Sometimes, the smallest gestures are the most powerful.

Cleaning Up London

After the London riots in 2011, lots of people wanted to do something, but weren't sure how to get involved. Twitter account **@riotcleanup** had the answer – it helped get out information about what kind of practical help was needed where, and got teams of volunteers coordinated to go out into the streets and tidy things up again.

Justice From Afar

Online petitions get a lot of criticism, but some can make a big difference. In 2014, a petition on **Change.org** demanded that Meriam Ibrahim, a Sudanese woman on death row, should be released. More than a million people signed it, bringing more attention to her case, and in the end she was freed, allowed to move to the US to start a new life.

GoFundMe

Go on, roll your eyes. It's become so common for people to use the site to pull together charitable donations that you're likely to be asked to sponsor someone's half marathon every time you log into Facebook. But while it's annoying to feel like your wallet's under constant attack, the site has made it easy for more people to raise more money for good causes.

So yeah, it's not all bad out there on the web. We probably won't be asking Twitter to suggest new names for the magazine any time soon, though.

BBC Micro Bit in 2016

David Briddock finds out what's happening with the much delayed BBC Micro Bit

In March 2015, the BBC Micro Bit launch caused quite a stir in the media. Announced as part of the BBC's Make It Digital initiative (**bbc.co.uk/mediacentre/mediapacks/makeitdigital**), it was designed to integrate into the school computing curriculum. The idea was to encourage children to discover how computing systems work through interactive experimentation and coding.

With its buttons, array of LEDs and built-in sensors, the Micro Bit has the flexibility to host a wide range of projects, from simple games to full-blown scientific experiments, and it can connect wirelessly to smartphones and tablets.

During the launch, the BBC promised to give a Micro Bit to every child in Year 7 (11- and 12-year-olds), soon after the start of the 2015 school year. But things didn't go to plan. We'll address these issues later, but first let's recap the components of the BBC Micro Bit.

Specification

The board itself is about the size of half a credit card (4cm by 5cm). It holds a Nordic Semiconductor nRF51822 ARM Cortex-M0 32-bit microprocessor running at 16MHz plus 256KB of flash memory and 16KB of static RAM. The ARM core can switch between 16MHz or a power-sipping 32.768kHz clock rate.

Two of the most prominent features are the 25 LED display, laid out in a 5x5 array, and three tactile push buttons (two for user input and one for reset). Other elements include a three-axis accelerometer for motion tracking, a three-axis magnetometer for compass headings or metal detecting, a digital thermometer and 2.4GHz Bluetooth Low Energy (BLE) wireless networking.

It also has a 23-pin edge connector with pulse-width modulation outputs, General Purpose IO (GPIO) pins, six analogue inputs and serial I/O, plus five ring connectors that accept crocodile clips or 4mm banana plugs.

Connect the Micro Bit to a PC, and it appears as a USB drive, so code can be installed using drag and drop operations. Power is provided via the micro-USB port or with batteries.

Early prototypes had an small integral battery, but after problems, a revised design means an external AAA battery pack is now needed to power the device as a stand-alone or wearable product.

Delay After Delay

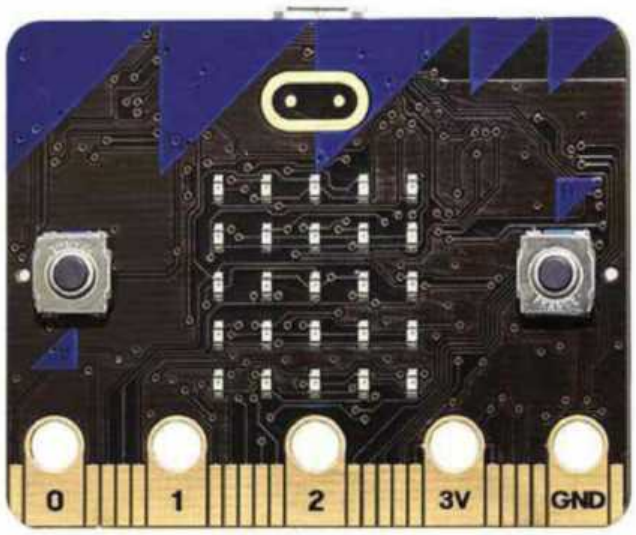
In summer 2015, the BBC still expected to give the Micro Bit free to every Year 7 child by October 2015. Some teachers were to receive prototype boards a month earlier than this date to gain a head start in lesson preparation. And promised manufacturing targets would allow the general public to buy Micro Bit boards before the Christmas holidays.

However, none of these things actually happened. At the last minute, the BBC revealed power supply problems had caused a delay. The hastily revised plan was to provide teachers with a Micro Bit board before the end of 2015 and Year 7 children early in 2016.

But as the new year started, there was still no sign of the boards. Pushed by the media, officials suggested availability would be delayed until the February half-term holiday, but the message was vague with phrases like "pushing to deliver as many as possible".

Initial enthusiasm is fading fast. Until March only a few lucky schools have been given prototype Micro Bit boards, and it wasn't until 22nd March that an official BBC announcement (**goo.gl/4MZKLF**) said the mass rollout had started.

Now we know many children won't have a Micro Bit before the third and final term. Quite understandably, teachers are now deeply concerned there's not enough time left to do it justice. Many are considering whether to suspend the whole exercise until the next school year.



Micro Bit - front view

Organisational Chaos

What's going on? BBC Learning executive Cerys Griffiths said, "The main issue has been some fine-tuning." The official BBC message is, "We have created hardware, it's very complex, it's very sophisticated, it's very new." Mmm… not very convincing, is it?

To placate teachers and students, the BBC is promising to roll out more copies of the device than it had originally planned, so some children in other school years should also receive a Micro Bit. But with such a bad track record, there's deep scepticism about whether this will happen.

> **"With its buttons, array of LEDs and built-in sensors the Micro Bit can host a wide range of projects"**

In the midst of all this chaos, the original design specifications have changed. Compared to the early prototypes, the board layout has been revised. Now it's more streamlined and easier to manufacture, although a rather more boring rectangular shape.

More importantly, the board now lacks a slot for a watch battery. Instead, you'll need a battery pack holding two AAA 1.5V batteries. Cost reasons were cited by the BBC team, along with health and safety issues, but it certainly isn't as neat a solution as a coin battery. On the plus side, as part of the board redesign, the Micro Bit gained an accelerometer motion sensor.

Too Many Chefs?

We can never know the real reasons behind these delays, but a clue comes from the 29 entries on the BBC's Micro Bit partner list. Here's a brief summary of some of the major partnerships.

Taking the hardware first, Nordic Semiconductors supplies the CPU, while NXP Semiconductors provides the sensors and USB controller. Technology Will Save Us (**techwillsaveus.com**) designed the physical appearance of the device, and manufacturing will be overseen by Farnell / Element 14.

The system software picture is also fragmented. ARM Holdings provides the 'mbed' platform and operating system, plus development kits and compiler services. Lancaster University developed the device runtime, and the BBC itself developed a Micro Bit App that connects smartphones and tablets with the device.

As for programming, Microsoft contributed coding tools and learning materials (more on this later). Samsung developed an Android app for smartphone and tablet connectivity, while ScienceScope is doing something similar for Apple iOS mobile devices. The Python Software Foundation is working on the MicroPython coding language, and Espruino provides a JavaScript interpreter, which can be remotely controlled via Bluetooth LE with the DroidScript mobile app.

In addition to all this, Barclays has signed up for product delivery and outreach activity support, while The Wellcome Trust (**wellcome.ac.uk**) is committed to delivering learning opportunities for teachers and schools.

This looks distinctly like a classic 'too many chefs' scenario.

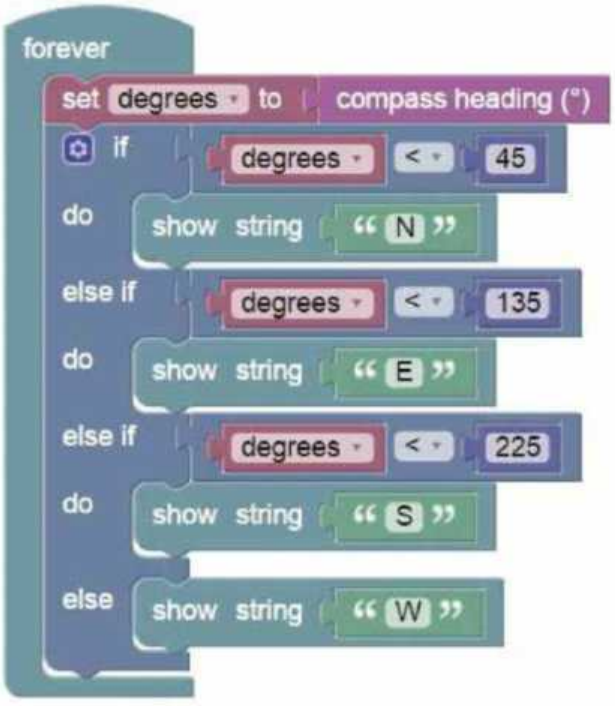
Online Simulator

Let's move on to coding. You might think talking about code is a little pointless without a Micro Bit board. However, during the delays, Microsoft and others have been busy rolling out an online code editing platform and Micro Bit simulator.

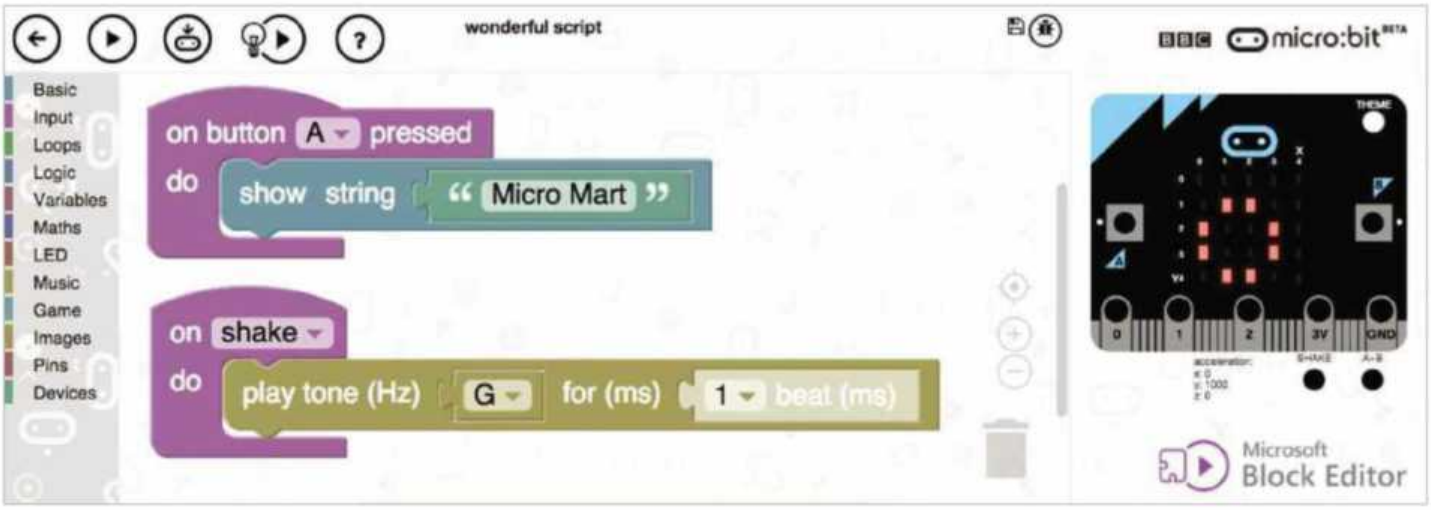
The simulator's primary purpose is to help teachers prepare lessons, but as it's freely available to anyone with a web browser, it also means we can have some coding fun (**microbit.co.uk/create-code**).

The board is displayed as a graphical image alongside the coding environment. Importantly, this image responds to mouse input, so buttons can be pressed and accelerometer motion simulated by moving the mouse over the image. You can even click on the input/output pins.

For certain coding situations, special buttons appear (for instance, a shake button and one that presses both the A and B buttons simultaneously). Even so, not everything can be simulated. Projects that involve things like wireless communication will have to be done with a real board.



Microsoft Block Editor compass blocks



Microsoft Block Editor

The website supports a number of different software development languages, as we'll see shortly. However, the Micro Bit board supports a few more, including the C/C++ language.

Code Blocks

Newbie coders can start with Microsoft's Block Editor to build code via colourful snap-together blocks (**microbit.co.uk/blocks/contents**). Some blocks listen out for button presses; some capture sensor data readings; others test the status of the edge connector pins; and there are many ways to control individual LEDs or the complete LED array.

If you've used MIT's Scratch (**scratch.mit.edu**), you'll find this kind of coding interface familiar. Just like Scratch, the Block Editor encourages youngsters to transform their ideas into code. To find out more, read the Block Editor book (**microbit.co.uk/blocks/book**).

Code Kingdoms is an alternative drag-and-drop, block-based coding interface. However, this time the blocks you choose are used to generate JavaScript code, so you start with blocks and end up with a JavaScript program. Currently, the coding experience isn't as smooth as with the Block Editor, but this may change in the future.

If you prefer, you can start with blocks, then continue by typing in the JavaScript code directly. This means Code Kingdoms neatly bridges the gap between blocks and text-based code. The Code Kingdoms cookbook (**goo.gl/QNssjS**) has plenty of project examples.

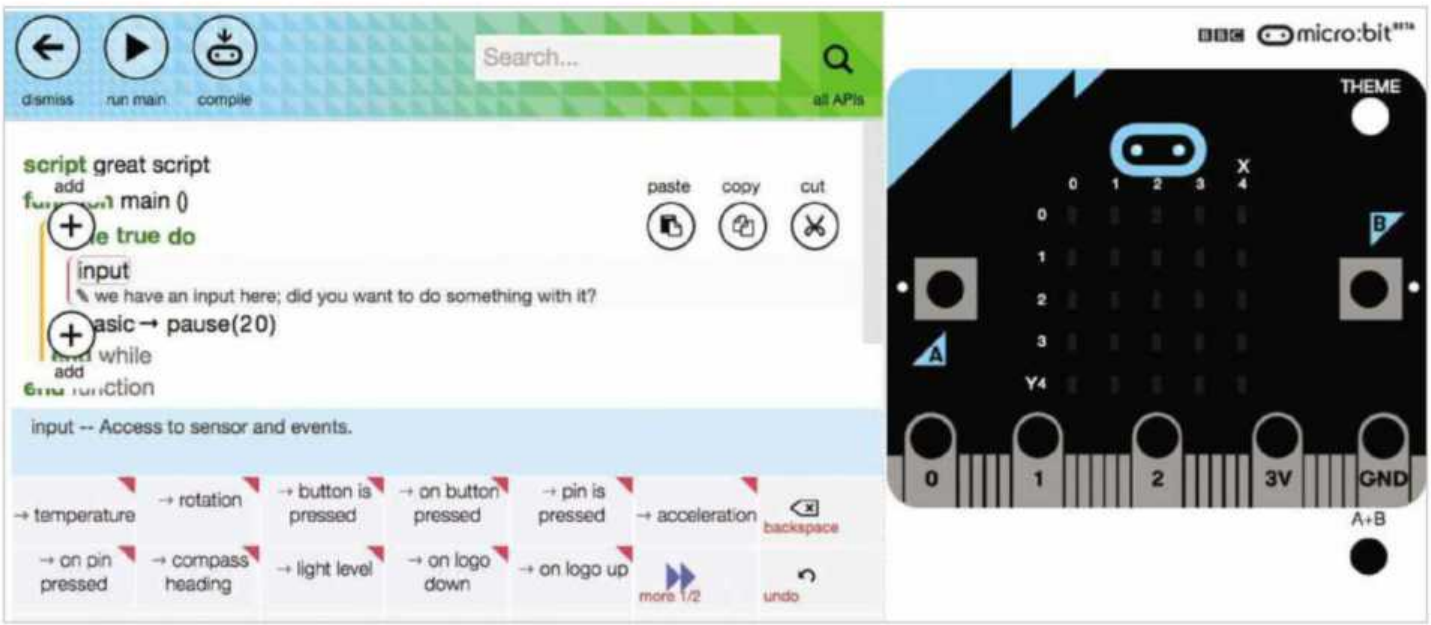
Code Scripts

More experienced coders might prefer Microsoft's TouchDevelop online environment (**touchdevelop.com/microbit**). TouchDevelop is a touch-friendly, text-based general purpose app development language. In this case, it comes pre-configured with a set of Micro Bit commands and libraries.

Command sets are presented towards the bottom of the browser window (see TouchDevelop image). Just click or touch a command to insert some code. When the code appears, a new set of command options will be automatically presented for the next step.

It's a great way to explore what's possible. However, after a while, you might prefer to simply type in the code, and with TouchDevelop you can do this too. In this case, the command options still change as you type, providing a useful visual reminder of what to type next.

Interestingly, you can start coding with the Block Editor then 'convert' the blocks to a TouchDevelop code listing. For a full explanation of what's possible, take a look at the TouchDevelop documentation (**microbit.co.uk/td/contents**).



Microsoft TouchDevelop

```
function main ()
    var counter := 0
    input → on button pressed(A) do
        counter := counter + 1
        basic → show number(counter, 150)
    end
end function
```

▲ *Microsoft TouchDevelop counter code*

Python coding support on the Micro Bit is provided by MicroPython. Here, Python scripts are combined with the MicroPython firmware and uploaded to the device. Python is likely to be a popular choice due to the huge collection of existing Python libraries and code examples.

MicroPython didn't go live on the website until mid March. So far, there's no simulator, but if you own a Micro Bit board, you can write Python scripts using your favourite code editor, then upload them via the micro-USB port.

Getting Started

As with any new piece of technology, it can be tricky to discover how to get started. In this case, everything is available from the official Micro Bit website.

On the Getting Started page (**microbit.co.uk/getting-started**), you'll find numerous introductory-level videos. They include an introduction to the Micro Bit board itself, overviews of the Microsoft Block Editor, Microsoft Touch Develop and Code Kingdoms coding environments, plus glimpses of maker-style projects.

In addition, each one of the coding environments has a series of online lessons, from simple newbie tutorials to more advanced Micro Bit challenges, such as building your own air guitar, and there are specific categories for coding and builder-focused projects.

The help page (**microbit.co.uk/help**) is a useful resource, as it covers a wide variety of Q&A topics. Meanwhile, Teachers and parents have their own page with lesson and project ideas (**microbit.co.uk/teachers-and-parents**).

Simple Projects

Even without writing a line of code, you can play a game of *Snake*. It's hidden in the pre-installed program. Just press the A and B buttons together when you see the heart animation.

The 25 LEDs can be programmed to blink, fade, display static or moving patterns and show scrolling text messages. The two user input buttons can be programmed to trigger events. They could start an animation, begin recording data, control a game and much more.

The accelerometer tracks the Micro Bit's movement and orientation in real-time, so it could be used to switch display information or as a game controller. And with a Bluetooth LE connection you can have fun communicating wirelessly with laptops, tablets, smartphones, keyboards, game controllers and so on.

The Micro Bit website has a collection of project tutorials ,which cover some of the ideas mentioned above in greater depth.

Pi Zero Comparison

How does the Micro Bit board compare with the £4 Raspberry Pi Zero? Well, the Pi Zero is a very different computing platform and a far more flexible device.

The Pi runs a fully featured Linux operating system. So you can install thousands of apps, and it supports just about any coding language. Plus there are masses of code examples and hundreds of active projects, and it's backed by a large and enthusiastic community that spans the globe.

In fact, you could use the Pi Zero, or any Pi model for that matter, to write programs and upload them to the Micro Bit. Also, the Pi could act as the control computer in a maker-style project, handling input and output from one or more Micro Bit devices. Remember, the Micro Bit already has sensors, buttons, LED array and wireless Bluetooth LE connectivity.

As of mid-March, the consumer price for the Micro Bit has not been set, nor do we know about availability, so it could be that a Pi Zero and sensor HAT combo might not be much more expensive.

Would you like to own a BBC Micro Bit? What would you use it for? Would you connect it up to your Raspberry Pi? We'd love to know, so drop us a line at letters@micromart.co.uk. **mm**

Micro Bit Links

- **Home:** microbit.co.uk
- **Help:** microbit.co.uk/help
- **Getting Started:** microbit.co.uk/getting-started
- **Coding:** microbit.co.uk/create-code
- **TouchDevelop:** touchdevelop.com/microbit
- **Teachers/Parents:** microbit.co.uk/teachers-and-parents

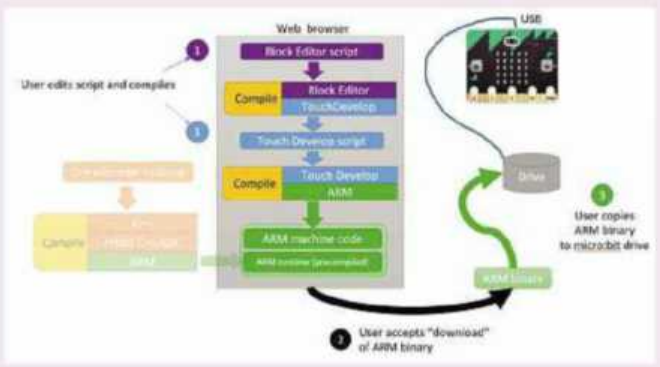
Code Deployment

When you finally get your hands on a Micro Bit board, you can export your code from the online coding environment and deploy it onto the device.

To do this, the block or script code needs to be converted into something that's understood by the Micro Bit's Nordic Semiconductor nRF51822 ARM Cortex-M0 microprocessor. There are a number of steps involved, including converting the code you've written into a binary 'hex' file and downloading this file to the board via the micro-USB port.

Fortunately, we don't need to worry about the details, as it all happens in the background after you press the 'Compile' button in the coding environment. But take a look at the Code Deployment diagram to see an illustration this deployment process for Microsoft's Block Editor or TouchDevelop tools.

▼ *Code deployment process*



Alphabet Pi: E

David Briddock meanders through Raspberry Pi technology from A to Z

THIS WEEK: Eben Upton, EduKits and eLinux

Eben Upton

Without Eben Upton, the Raspberry Pi family almost certainly wouldn't exist. In 2006, he approached his employer, Broadcom, about creating a small, low-cost programmable computer around the Broadcom system-on-a-chip. He wanted to recreate the kind of excitement we saw in the 1980s with the BBC Micro, Commodore 64, Sinclair Spectrum and other similar home computers.

Eben worked with Norcott Technologies' engineering director, Pete Lomas, and David Braben, co-author of the BBC micro game *Elite*, to found the non-profit Raspberry Pi Foundation (**raspberypi.org**). Three years later, in February 2012, they launched the $35 Raspberry Pi Model B.

Just as he hoped, the Pi has been the focus of fevered excitement over the last four years. And with over six million sales so far, it's a success story that's surpassed anyone's wildest dreams.

> **"Each EduKit adheres to a 'no soldering' construction methodology"**

Despite being the media front-man for the ever growing Raspberry Pi family, Eben is still employed by Broadcom as a technical director and system-on-a-chip architect, while also being the CEO of the Raspberry Pi (Trading) Limited.

EduKits

Created by the Cambridge CamJam community, EduKits start from a very pocket-friendly £5 – great news for cash-strapped schools or parents looking for present inspiration.

Each EduKit adheres to a 'no soldering' construction methodology. Instead the various component wires are pushed into ready-made slots in a small prototyping breadboard. It's a perfect scenario for the novice circuit builder, and each kit has a number of fully explained code examples written in the popular Python language.

The £5 EduKit 1 includes a collection of basic electronic components that offer a gentle yet rewarding start to Raspberry Pi hardware hacking. EduKit 2 has quite a few more components to play with, yet still only costs £7.

EduKits 3 is a little different, as it has a specific purpose in mind. Inside the sturdy two-part cardboard box there are all the electronic elements necessary to build your own motorised, environment-sensing robot. Both DC motors come with pre-soldered wires, which are shrink-wrapped for protection and sturdiness. And the motor controller board, complete with ready-made GPIO connectors, is also pre-soldered.

EduKits 3 costs just £17 plus delivery (£2 with a Pi Hut order). It's quite possibly the cheapest robotic kit available in the UK. Just add some sort of chassis and four AA batteries to power the motors. The chassis could be anything. Something like a cardboard/plastic box lid or a plywood off-cut is fine, or you could decide to design your very own 3D-printed creation.

CamJam worked with The Pi Hut (**thepihut.com/edukit**) to distribute the kits, and any profits are ploughed back into future CamJam events, educational initiatives and the Pi community.

eLinux

The eLinux website is an impressive information repository for embedded technology. The Raspberry Pi section (**elinux.org/RPi_Hub**) is an invaluable resource for any Pi owner, but especially those interested in attaining a deeper understanding.

You'll find detailed and comprehensive information on board design, peripheral hardware, operating systems and apps. While educational material includes projects, tutorials and numerous coding examples in Python, C, Linux shell script and many other languages. **mm**

Remembering... Batch Files

Back to a time when scripting was king

Windows is a great operating system for modern users. Within reason, it'll provide everything you'll ever need in terms of your work and administering the system, all from its fancy-looking graphical user interface.

Sadly, though, there's rarely a need these days to drop back to the command prompt and tap away at the keyboard like someone possessed. Obviously you can opt to enter CMD into the Windows Run menu, and use it to reveal your IP address, ping another computer or even rename several file types to another type, but it's nothing compared to the old DOS and Windows 3.11 days, when the command prompt still ruled supreme.

The major thing I miss about the command prompt is the batch file. I think I had a batch file for nearly every possible situation that my computer would ever come across. Need networking? Not a problem: there was a batch file to activate the NIC. Need to back up the entire C-drive? Yup, had that sorted.

The most recognised batch file was of course Autoexec.bat, that quirky start-up script file that allowed you to load DOSKEY and your mouse driver into high memory areas. But you could modify that to include a menu system that would, depending on the user's choice, load a certain device or start with more conventional memory allocated to be able to run a game, for example.

Its History

Batch files were around from as early as 1981, back when IBM released its DOS 1.0 for these new-fangled personal computers.

However, there were only a few commands available and supported by command.com: dir, copy, erase, pause, rem, rename, date, time and type. That didn't offer a huge amount of scope for the early PC user, but it could still process .BAT files, and that made it quite a flexible platform. Incidentally, I think the batch file editor of the time was EDLIN, but I'm sure there are some of you old enough to correct me.

Batch files really got to spread their wings when later versions of MS-DOS started to appear, especially with DOS 4.0 and its new multitasking features.

As time moved on, more devices and hardware were becoming the norm for the PC. This of course meant that the user had even more control over what was loaded and how. And with the availability of better commands to use within DOS, the user could make choices as to where in the available memory a device could be loaded.

Gradually, the batch file became more and more obsolete. Windows XP saw the last of the batch file being generated through the creation of DOS disks. Naturally, you can still create a batch file, even with Windows 10, but it's severely limited in its use due to the limitations of what's available via the command prompt.

These days, the batch file has seen something of a revival through PowerShell scripting. Although it's not a batch file in the old sense, it's still a command line based script, so we'll let it off.

Did You Know?

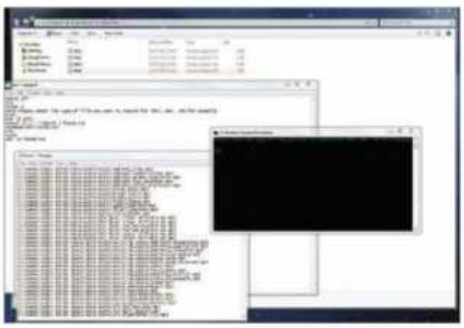
- Fork Bombs, enough said.
- Using a double colon instead of REM resulted in a quicker batch file execution.
- Use command /y /c (name of the batch file) to step through it line by line.
- Run all your batch files in a RAM drive for increased speed.

The Good

Batch file weren't just for admin duties; you could create games with them. Loading various hardware into strange memory locations. Creating elaborate menus to end up launching something that would have been quicker from just the command prompt.

The Bad

When someone gave you a batch file that you didn't check, and it contained something like format c: /Q /y / AUTOTEST. mm



Batch files could let you create all manner of wonderful shortcuts

We even created a batch file quiz game some years ago

Other users even made the likes of PacMan with a batch file

Developers, Developers, Developers...

David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

Mac comes out on top

The results of an interesting survey conducted by stack Overflow have recently come to light, and it shows some rather surprising numbers.

The survey asked 45 questions, with 56,033 developers across 173 countries taking part. The questions included where the developers was in the world, what was the most popular technology, Star Trek or Star Wars and which desktop operating systems the developers used.

It's the last entry, that comes out as an oddity, at least from my point of view. According to the survey, Mac OS X came out on top as the most used operating system by the developers who answered. Here are the results:

- Mac: 26.2%
- Windows 7: 22.5%
- Linux: 21.7%,
- Windows 10: 20.8%
- Windows 8.1: 8.4%
- Windows XP: 0.4%
- Windows Vista: 0.1%

What I find extraordinary – aside from the 0.1% using Vista – was that Windows 7/10 and Linux weren't the highest. I naturally assumed, not being a programmer, that Windows would take the top slot, with Linux following and Mac coming in third.

Furthermore, out of the Linux choice, Ubuntu came out as the most used distro at 12.3%, with Fedora, Mint and Debian taking 1.4%, 1.7% and 1.9% respectively. I assume other distros took up the remaining percentage of users' choices.

Environments

I thought it was also quite interesting to see that Notepad++ took the top slot for developer environments, which include IDEs, text editors and other coding platforms.

Notepadd++ managed to have a 35.6% share of the environments, with Visual Studio joint first, and Sublime Text coming in second place. Also another surprising entry was Vim, which came in third with a huge 26.1%.

JavaScript came out on top as the most popular technology per dev type, with an impressive 85.3%. SQL came second to JS with 58.9%, with an odd low for C# in third with just a 37.3% share.

Wars Or Trek?

The survey made for some eye-opening stuff, especially with the preferred desktop environments and the fact that people still use Vim (and I'm still not over that 0.1% Vista use).

Of course, the most important information gained through the survey was the preference of developers between *Star Trek* or *Star Wars*.

Those under 20 years old opted for *Star Wars* with a huge 66.9% compared to 19.3% for *Star Trek*. The 40- to 49-year-old-range – my generation – also had *Star Wars* as the top choice with 54.4% and *Star Trek* at 38.1%.

It was the 50-plus developers that saved *Star Trek*'s reputation, though, with 50- to 59-year-olds preferring the final frontier over a galaxy far, far away (52.5% compared to 31.4%). The 60-plus folk voted 47% for *Star Trek* to and 29.3% for *Star Wars*.

Who says we never provide you with the important news?

On The Pulse

The survey can be found at **goo.gl/UT7jPl**, with options to break some of the categories down by previous years, if possible. It's certainly worth a look.

The positive note is that Linux has risen slightly from previous years. It probably won't be top of the poll for some time to come, if ever, but it's gaining ground as a popular all-round, cross-platform environment.

And I much prefer *Star Wars* to *Star Trek*.

The Stack Overflow survey reveals some interesting numbers

Back To The Mac

Apple has kept OS X and iOS separate, but Craig Grannell would like iPad apps to work on his Mac

Unlike Microsoft's attempts to shoehorn full-fat Windows into every single piece of remotely compatible hardware, Apple's approach to operating systems has been more nuanced. Quickly realising there was no way to get OS X running on an iPhone, it ended up creating iOS. The benefit was that Apple got to start from scratch – a clean slate, rather than working atop years of accumulated cruft. And although iOS was at first a little basic and unfinished, it's grown to become a robust and surprisingly capable operating system. Moreover, while Apple still doesn't share an OS between mobile devices and Macs, concepts become threads that run between them. Thus, we see applications and services working in very similar ways across iPads, iPhones and Macs, even if they're not identical. In some cases, you'll see apps like writing tool Ulysses, where the Mac and iPad versions are almost indistinguishable, yet work equally well.

Perhaps it's this kind of thing that drives certain commentators to still imagine – or even assume – some kind of bold future where Apple merges its operating systems. Most such souls take that to mean that the iPad will eventually become much more Mac-like. This is largely because they feel stymied by perceived limitations, even if many of them aren't really limitations at all. With an iPad Air 2 or iPad Pro, you can now run apps two-up, and apps will also merrily beaver away in the background, when there's a requirement to do so. If you're genuinely annoyed about not being able to see a much larger range of apps in front of your face at all times, you're either some kind of multitasking guru or need to learn the concept of focusing.

My thinking on this subject increasingly heads in the other direction. If anything, I find myself wanting my Macs to be more iOS-like. I enjoy the sense of focus iOS brings, so I often work with Mac apps full-screen, especially when crafting text-based articles like this one. I also find myself drawn to products that do one thing really well, rather than trying to be all things to all people.

Additionally, I would genuinely love to see certain iOS apps cross over to the Mac. That might sound ludicrous, given that desktop machines – and by extension the apps that run on them – remain inherently more powerful than even the mightiest iPad. But, as mentioned, there's a sharpness to many iOS apps that's far rarer on the Mac. One example is iOS classic Korg Gadget, which provides a set of virtual synths and brilliantly rethinks dealing with sequencing and song arrangement. There are of course plenty of music apps on the Mac – not least Apple's own Logic – but none work for me nearly as well as Gadget.

Part of the joy of Gadget has been that it's an iOS app rather than a Mac one, so I can use it for making music wherever I happen to be. But I'd be extremely happy if I could also run the app on my Mac, perhaps for making quick edits, more easily riffling through documents, and making final tweaks to songs before outputting them to mastering software. Naturally, any such 'crossover' app would have to work with a non-touch interface, but then it's arguable the iPad could do with more fully embracing pointers and keyboard shortcuts, so benefits could head in both directions.

Naturally, this is all very unlikely. Apple quite reasonably wants to keep space between its operating systems; it doesn't seem likely that this summer's developer conference will unveil 'iOS on OS X'. Still, everyone once thought keyboards as a 'default' for iPad were anathema to Apple, and then the iPad Pro appeared, so you never know.

Korg Gadget is a superb iOS app. Having it run on OS X as well would be, to use a favourite Apple word, magical

Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find **Craig** on Twitter at **@craiggrannell**

The Internet of Weird Things

Ian McGurren looks at some of the stranger things to connect to your phone

Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

New technology streams often start out with some ground-breaking ideas, but as the bandwagon gets rolling, those ideas get more and more...unorthodox, especially when costs fall. To that end, the oft-touted next big thing – the Internet of Things – is starting to gather pace, and all sorts of weird and sometimes wonderful devices are appearing. Let's have a look at some of the delights you can hook up to your smartphones and tablets...

Kuvee Wine bottle

Yes, you thought wine in bottles was a pretty done deal (we won't mention boxed wine), having been happily coexisting for years now. Surely, though, you've thought this those bottles could be smarter? No? Well, Kuvee has, and to that end, it's launched a system that brings wine into the connected 21st century. Well, it's not strictly a bottle, more a sleeve that a bottle goes inside, though not any standard bottle, but one of Kuvee's smart-enabled ones. Pop the bottle in, and you get a label and lengthy description of the drink right there on the touchscreen. It also has a new valve on the smart inner bottle to keep the wine fresh for up to a month – arguably the real headline here. At $200, though, it's a bit of a gamble, unless you buy it when drunk on wine, then it's a surprise.

Eight Smart Mattress Cover

Somewhat more practical than a smart wine bottle is the oddly monikered Eight, a smart mattress cover. We've had sleep apps for quite a while now, and some swear by their ability to lock onto the body's circadian rhythms and wake you at the optimum time. Eight does this too, as well as offering both heating and cooling built in, a nice step up from the old electric blanket. Eight allows you to not only do this via your smartphone, but also to sync to your tracker or smartwatch. All useful stuff if you want that macro level of your nocturnal activities. At $249, it's expensive for a mattress cover but reasonable if it lives up to its promises on those cold / warm nights.

Revogi Smart Candle

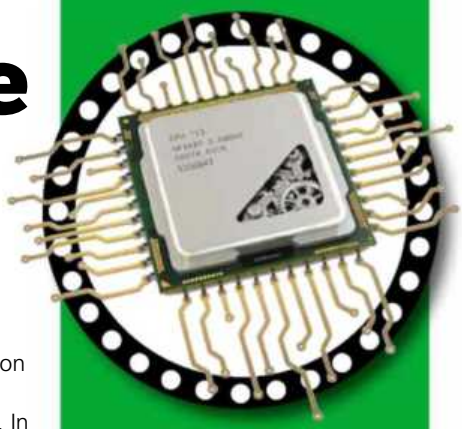
And what could make that bedroom more relaxing to go with your temperate smart mattress? How about a smart candle? Controlled from your smartphone or watch. It's not a world away from the Philips Hue bulbs that have been about for a while now, but it's somewhat cheaper and more candle-like. Run from an app called Delite, it's a case of on and off but also more interesting functions such as colour change, being able to switch them off when out for security, and er... disco. Well, why not? For around £20. they're reasonable priced too.

Quirky Egg Reminder Tray

From the odd to the, er, odder, and here's something you might not have imagined before: a connected egg. Okay, not the egg per se, but the tray in which it resides, keeping a smart eye on your egg situation, even indicating the oldest, saving all that pesky egg rotation that takes up so much of your time. You can use the connected app to check your egg situation on the go too – what an age we live in. For this eggciting, product you'll need GE's Wink app, so sadly we in the UK don't have it just yet. But for our Stateside chums, it's around $50 to shell out. Sorry for the bad yolks...

That's just four for starters, and whether the IoT will ever gain a killer app, however, is yet to be seen. In the meantime, the future promises many more barmy oddities and follies.

What A NAS Surprise



Synology releases its DSM 6 NAS operating system after a six-month beta test, as Andrew Unsworth reports

We're approaching that time of the year when new components, particularly graphics cards and processors, start to be dropped on a possibly unsuspecting – but most definitely interested – public. At the time of writing, news of the AMD A10-7890K and the Athlon X4 880K has broken, although we won't be able to buy them until the end of March.

The A10-7890K is AMD's latest accelerated processing unit (APU), which is what it calls its CPUs with built-in Radeon graphics processors. These chips have always been something of a bargain, and while the graphics power of the built-in GPU hasn't been as good as a discrete card, it's been better than you'd expect and perfectly capable of light 3D gaming.

The A10-7890K is a four-core chip with eight GPU cores and a 95W TDP. Base clock speed is 3.9GHz, with frequency rising to 4.1GHz with turbo boost. However, the A10-7890K is unlocked, so it can be overclocked to provide even higher performance. The retail version of the A10-7870K comes with the Wraith cooler, which AMD says is near-silent.

AMD says the Athlon X4 880K is the "fastest multi-core Athlon processor ever released" and cites its 4.2GHz maximum turbo boost speed as evidence, although the previously fastest Athlon had a 4.1GHz, so the frequency increase isn't that extreme. The four-core chip has a generous base frequency of 4GHz, and because it's unlocked, owners will be able to overclock it so it runs at even higher frequencies. The Athlon X4 880K comes with a promising new heatsink and fan assembly called the 125W Thermal Solution too, which is the Wraith cooler with the fancy illuminated surround taken off. The 125W Thermal Solution should operate near-silently too. If it provides enough cooling to allow a meaningful overclock, then all the better.

Benchmarks for 1440p and Ultra HD gaming (with an X4 880K, coupled with a Radeon R7 370 graphics card) look respectable. AMD's figures claim 66.9fps in *Counter Strike: Global Offensive* at a 4K resolution, and 126.7fps at 1440p. AMD says these benchmarks were taken with the game running at 8x MSAA and with the highest detail settings enabled.

I don't have UK prices just yet, but the US price for the A10-7890K is $165, which means it should sell for around £118 going off conversion rates at the time of writing – assuming it's a straight conversion, of course.

Another neat addition is the bundling of the currently available AMD A10-7870K with the 125W Thermal Solution. Any additional cooling is great, but the promise of nearly silent performance will be a big draw for those who want a decent amount of power but don't want their gaming or work interrupted by the sound of an angry hairdryer.

AMD says all the new products will be on sale at the end of March, so the temptation to buy one of them so soon after pay day will be immense. In my experience, the combination of an AMD A-series chip and an SSD has always produced a snappy, responsive and relatively powerful low-cost computer. The ability to build a bargain PC around them is especially true given the relatively low price of AMD motherboards.

The A10-7890K is particularly compelling because, when combined with a £40-£50 liquid cooler, the ability to overclock it makes it a (potentially, depending on UK pricing) wallet-friendly chip for enthusiasts that want to tinker but don't want to risk frying a £200-plus CPU.

Pi Time

Also fresh out is the Raspberry Pi 3, which I'm sure has been covered extensively elsewhere. However, it's worth saying that if you haven't already experienced the joy of Pi, then you should put your hand in your pocket and shell out for one. It costs less than the price of a meal, so even if you only tinker with it for a month or two before passing it on to someone else, it's been a worthwhile investment. I must admit that I don't give my Pi 2 the attention it deserves, but I'll be rectifying that in the next few months.

Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none

Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*

The Dark Knight Returns

The Caped Crusader often gets to flex his muscles in videogames, but Telltale's forthcoming Batman adventure promises to be a more cerebral outing for Gotham's dark detective

This week, Ryan checks out the first details from Telltale's Batman adventure game, and checks out the lawsuit filed against a popular game on Steam...

Plug & Play

The point-and-click adventure genre has enjoyed a miniature renaissance in recent years, thanks in no small part to Telltale Games, who've spent the last decade creating such episodic hits as *Sam & Max*, *Tales Of Monkey Island* and *The Walking Dead*. From its relatively small beginnings, Telltale has grown to the point where it's handling some of the biggest properties on the planet; *Game Of Thrones* and *Minecraft* are but two of the famous names the studio has co-opted into tried-and-trusted format.

Telltale's next game could prove to be its biggest – and, by the sounds of things, complex – release yet: *Batman*. Although announced last December, Telltale only began to divulge more detail about the game at the SXSW film festival. Once again an episodic adventure, with the first 'season' of *Batman* taking in five chapters, the game will, however, take a rather different approach from Telltale's previous titles. Unusually, *Batman* will explore "the man behind the mask" as much as the Caped Crusader himself, with billionaire Bruce Wayne's interactions with the people of Gotham changing depending on how the player chooses to tackle each scenario.

"Each night, Bruce Wayne chooses to change Gotham for the better," Telltale wrote in a post-SXSW blog post. "The team wants to explore what the consequences are of the player's actions when decisions made as Bruce have a critical impact on his nightly crusade as Batman, and vice versa. Certain key situations will give the player the decision to approach a scene as Bruce or Batman, with consequences for both sides."

Those player decisions, Telltale says, will affect Bruce Wayne's relationships with other characters in the game, whether they're criminals or allies; "Decisions made as Bruce or Batman will affect their paths towards corruption or redemption."

That's an interesting concept all by itself, and we're intrigued to see what a more cerebral Batman game might look like. We've seen plenty of action games explore the hero's physical side in the past, not least Rocksteady's bruising *Arkham* series of games. But how many games have attempted to portray Batman's life away from the gadgets and nocturnal fist-fights the crime fighter's more commonly associated with?

Tellltale has said it's going for a mature tone akin to an R-rated film, with visuals inspired by such comic book artists as Jim Lee or Neal Adams. Our great hope? That Telltale bring us the World's Greatest Detective version of Batman, who fights crime with his brain as well as his brawn. That's an incarnation made famous by DC's comics, but rarely portrayed outside those pages.

Batman's opening episode will debut this summer.

Online

Ark: Survival Evolved isn't even out of Early Access, yet it's already one of the most popular games on Steam. The dinosaur-riding, weapon-crafting game seemed to come out of nowhere when it appeared last June, and within less than a year, its fame has grown to such an extent that an eSports-ready version of the game, *Survival Of The Fittest*, has now been launched. That the stand-alone "multiplayer online survival arena" will offer a monthly prize of $50,000 to its top-ranking players shows just how far *Ark* has come in such a short space of time.

According to recent reports, however, this hit survival game is now locked in its own existential struggle: simply put, *Survival Evolved*'s developer, Studio Wildcard, is facing a lawsuit from

▲ *One of the most popular games on Steam, Ark: Survival Evolved could be temporarily withdrawn if a lawsuit filed against Studio Wildcard is successful*

another firm which could see the game removed from Steam.

The drama began late last year, when Trendy Entertainment, the company behind the online game *Dungeon Defenders*, filed a suit against Wildcard claiming one of its former employees, Jeremy Stieglitz, had signed a contract containing a "non-compete" clause blocking him from developing a rival game at another studio. Stieglitz, Trendy maintains, has been working on *Survival Evolved* while still under that contract, resulting in "a devastating impact on Trendy's business" according to legal documents acquired by Kotaku.

Wildcard, meanwhile, maintains that Stieglitz hasn't been directly involved with the game's development, and describes the suit as "irrelevant, immaterial, impertinent, and scandalous." Trendy's claims, Wildcard has stated, read "more like a salacious tabloid story than a short and plain statement of the ultimate facts."

Whatever those "ultimate facts" may be, Trendy's suit could cause problems for *Survival Evolved*. The case is due to be heard in court towards the end of April, and if Trendy's successful, development on *Survival Evolved* could be halted in its tracks, and the game removed from Steam's virtual shelves, until the situation's sorted out.

On the face of it, the vast difference between *Survival Evolved* and *Dungeon Defenders* – a tower defence action RPG hybrid – might call into question Trendy's claims that Stieglitz "Misappropriated Trendy's proprietary information, intellectual property and trade secrets" for use in *Survival Evolved*. However, as laid out by *Kotaku*, the case is far more long, complicated and messy than we've space to go into here.

With Wildcard yet to state its case, the whole suit may prove to be a storm in a teacup, but the whole scenario's a reminder that, when there's big money and contracts involved, the games industry can be a very serious business.

Incoming

Telltale Games may be the rock stars of the modern point-and-click world, but Czech developer Amanita is arguably its smaller, more eccentric but no less talented cousin. Its *Samorost* series began with a browser game in 2003, establishing the studio's intimate, captivating visual style. Mixing hand-drawn and painted backgrounds with charming puzzles, Amanita's games are as much like interactive pieces of art as they are conventional adventures.

From its small beginnings, Amanita's profile has grown through titles like *Machinarium* and *Botanicula* – games rich with disarming characters and quietly affecting stories. The studio's run of form continues with *Samorost 3*, a wonderfully odd adventure which takes in giant anteaters, lush forests and plaintive, alien-sounding music.

Like the studio's previous games, *Samorost 3* is more about the richness of its storytelling and atmosphere than its challenge. However, with it being Amanita's first HD release, it's easily the studio's most beautiful game so far.

Samorost 3 is available now.

▲ *Point-and-click specialists Amanita are back with Samorost 3, another magical amalgam of surreal storytelling and beautiful hand-drawn artwork*

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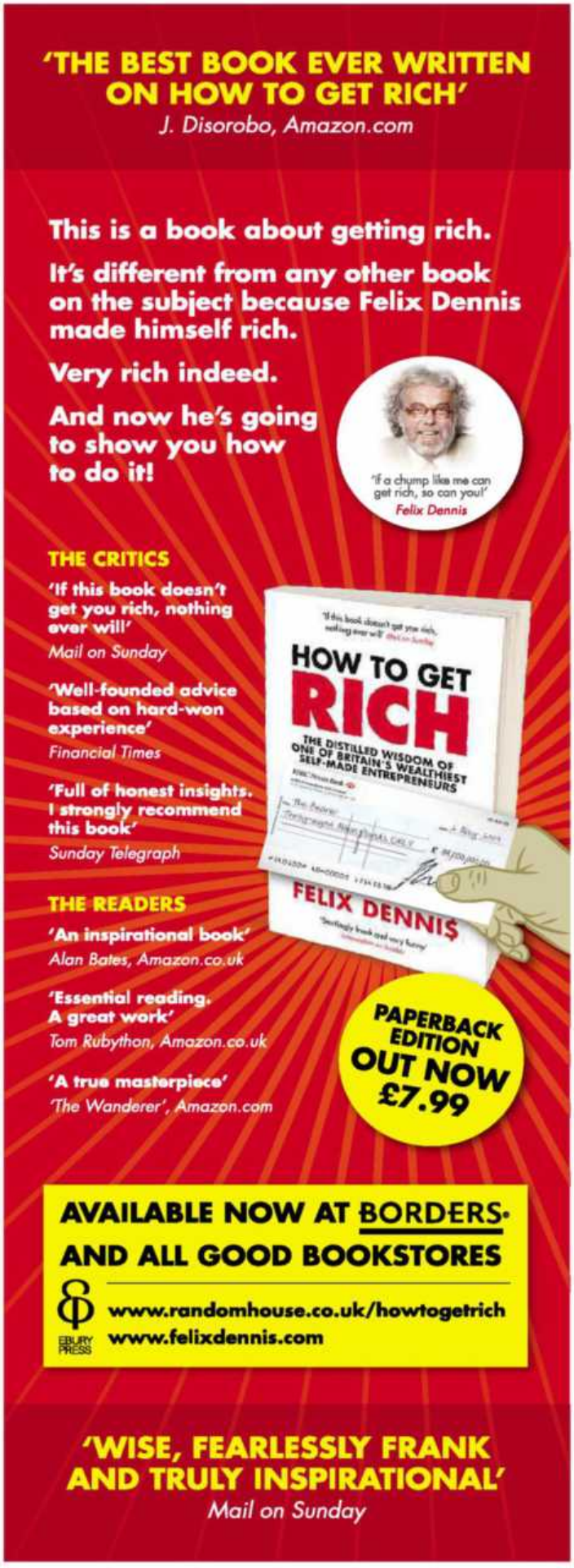

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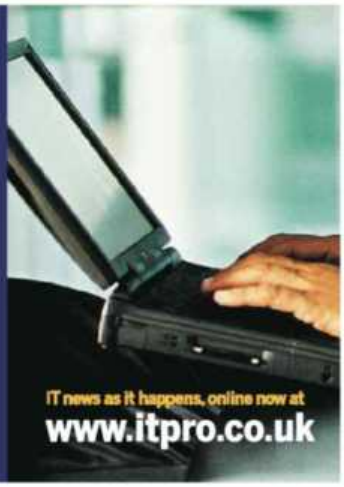

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Aaron

Noisy Cooling

My PC was built for me on order from a local vendor, and I purchased it a couple of years ago. I bought the PC to be used as a media centre, which would sit next to the TV in my living room. It's not a small system, but the mini tower case sits behind my TV unit so it doesn't take up to much space.

It's been in operation ever since, and has been a great media centre, always functioning well, and doing its job. I rarely turn it off, as one of the design choices was for a low power use system. I also use it constantly, as it's the device I stream programs from using services like Netflix.

So far, so good, at least that's what I thought. In the last few days I've noticed a loud whirring noise coming from the system, and occasionally this increases in volume. As its right next to the TV, it's very noticeable, to the point where it becomes really irritating when we're trying to watch something.

I've not touched the system or made any changes, and to my knowledge, no one has even been near it, as it's right behind the TV unit, so isn't easy to reach without effort. I know the kids wouldn't mess with it either.

Care to shed any light on this for me? I'd really appreciate it. As you may guess, I'm a little worried about messing around myself, as it was built for me, not by me, as I'm no expert.

Ade

From your description, my first thought would be the system would benefit from a good clean. The sound you're noticing is likely coming from your system's fan(s), and this is often down to a general build up of dust and detritus inside the case. If the fan blades become encrusted in dust, which is very common due to the high temperature inside the case that causes the dust to become caked on, the fan itself is likely unbalanced. This can cause it to produce noise. In severe cases, the unbalanced weight can even damage the fan, or the bearings, causing even more instability, thus producing more noise.

A lot of dust and dirt building up in the case can also cause general overheating and other issues, so I'd highly recommend you dig out the tower, crack it open, and give it a good clean. Vacuum out all of the dust, and gently clean the insides, including the fins on your cooling fans. Be very careful with the CPU fan, and ensure you don't use any solvents or anything too abrasive when cleaning.

Once the insides are clean, turn on the system and see if the noise persists. If it does, the bearings of the fan, or the fan itself may be damaged. Case fans are very cheap, and easily replaced, and CPU coolers aren't all that expensive. If you need to buy a new CPU cooler, it may be a good idea to look into passive cooling instead of standard fans. This uses heat sinks instead, with no moving parts, so noise isn't an issue.

If you're really not comfortable opening up your system at all, then you'll need to get a more experienced friend or your local computer service shop to look at it on your behalf. To be honest, I'd highly advise against the latter, as it will cost you and that kind of expertise is really not what's needed at this point. As long as you're careful in how you go about things, there's really nothing to worry about here, and it's certainly not worth the cost.

Once you solve the issue, you may also want to reconsider where the tower is positioned. If it's behind a large TV unit, there's likely a restricted airflow, around it meaning heat can build up. That means any dust issues could be exaggerated. It's best to keep systems in a more ventilated area, and off the floor, not sat on carpet, which naturally gathers dust and dirt. Raise the system off the floor, and ensure there's plenty of room for air to flow in and out of the system.

If your PC's innards get to dirty, cooling performance almost always suffers

Grubby

I've been playing around with different operating systems, as I want to get more experience of them than Windows, and would like my PC to have the flexibility of using more than one OS. I've also been generally interested in Linux for a long time now, but didn't want to take the plunge until recently.

After doing a lot of research online, I decided to set up a dual bot system on my PC, keeping Windows as it is, but adding the option to boot into Linux via Grub on an external hard disk should I wish. This worked very well, and I had both Windows and Linux up and running on my system, and was able to use both as and when I needed.

I then chose to return to a single OS on my main PC, as I was happy to make full use of Linux, and so installed it on another cheap PC I managed to acquire. I felt this would give me more flexibility with the Linux set up, and it wouldn't take away from my Windows PC, which is still my main computer for everyday tasks.

The issue I have now, however, is with booting my Windows system. When I try to do so all I get is a Grub rescue mode prompt, which is odd as I removed Linux, and it no longer sits on the hard disk. Because of this, I can no longer use my Windows PC, which is a major worry, and I'd very much appreciate any help you could provide to get my PC back.

Taylor

I think the key here lies in your choice of Linux environment. By this I mean the decision to install the OS onto an external hard disk instead of an internal partition or drive.

When you did this, your system would have to boot from the USB drive first in order to accommodate the boot Grub boot menu for the dual setup. However, now that you've removed the OS from the external drive, when this happens Grub can no longer find the OS.

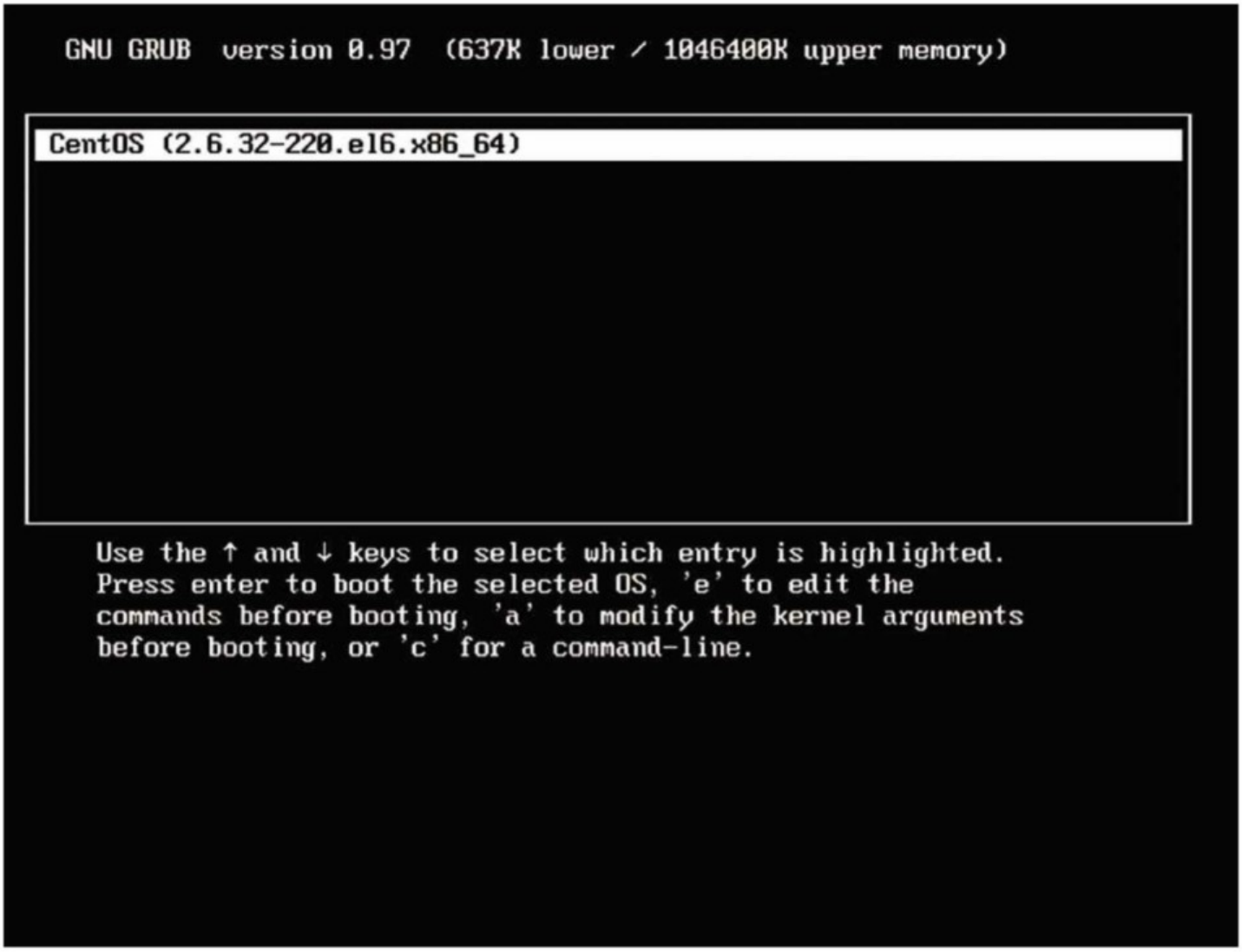
Grub is still firing as your BIOS boot order is likely still prioritising the USB device, which has the Grub boot loader on it. Luckily it's fairly simple to solve this. You will need to head into your BIOS and change the boot order, moving the USB drive down the list.

You could also simply remove the USB drive. However, if you wish to use it, the BIOS option would be the better choice.

Alternatively, you could simply format the USB drive. That may not be an option if you have a lot of data on it and don't have the space to back it up, though. .

Whichever option you go for, when the system is directed to boot from your internal drive before the external USB volume things should return to normal.

If you're running a Linux OS from and external drive and remove it, be sure your BIOS boot order isn't causing problems



ASK JASON

Meet Jason D'Allison, a veteran of Micro Mart's panel of experts. He's here to help with any technical questions, including anything to do with tablets or smartphones, as well as PCs

Send your questions to:
Jason D'Allison
Micro Mart
Dennis Publishing
30 Cleveland Street
London
W1T 4JD

Contact Jason by email at:
jason@micromart.co.uk

While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

All Aboard The Skylake

I'll soon be building a new rig. It's for general use – the web, office jobs, casual gaming. Below is the list of parts I'm eyeing up at the moment (the prices are from **www.ebuyer.com**).

- Core i3-4170 (3.7GHz, dual-core): £94.98
- Gigabyte GA-H81M-H: £37.98
- Crucial 2 × 4GB DDR3-1600 (CL11): £28.49

Obviously this is a Haswell base (LGA 1150), and ideally I'd love to buy into Skylake (LGA 1151), but it looks as though this would be lots more expensive. Would the extra expense be worth it? Does DDR4 offer much benefit? I'm not convinced, but I'd appreciate your thoughts.

Ian McGregor, Gmail

*In fact, Ian, the difference in cost between Haswell and Skylake is minimal. Take a look at the parts list below (the prices are also from **www.ebuyer.com**).*

- *Core i3-6100 (3.7GHz, dual-core): £96.99*
- *Gigabyte GA-H110M-S2H: £50.07*
- *Crucial 2 × 4GB DDR4-2133 (CL16): £27.48*

Your list comes to £161.45; mine comes to £174.54. There's not a great deal in it, is there? For the extra £13.09, you'd be rocking a faster CPU, faster RAM, and a superior motherboard (more SATA III ports, wider USB 3.0 support, and a PCIe ×16 slot conforming to PCIe 3.0, not PCIe 2.0). You'd also be running the latest platform, of course, not something that's end-of-line. Cheaper motherboards are available, but I've chosen one with HDMI, to match what you picked originally.

Does DDR4 offer much benefit over DDR3? Well, clock-for-clock, they're broadly neck-and-neck. Sometimes DDR4 comes out on top; sometimes DDR3 does. DDR4 tends to have slightly higher CAS latency – not good – but this is offset by improvements in other areas. The biggest improvement is that DDR4 can clock as high as 4000MT/s (maybe higher), whereas DDR3 is limited to about 2800MT/s.

*1600MT/s is probably the mainstream speed for DDR3, while 2133MT/s is the *entry-level* for DDR4 – there's nothing slower. You'd get more memory bandwidth right off the bat. The modules I've quoted above have a CAS latency of 16, which is high, but a fiver more would get you modules with a CAS latency of 13. It'd be worth it. For more information on this subject – it's a tricky one to explain in a few short sentences – take a gander at **goo.gl/6ljsf4**.*

Now, the extra bandwidth afforded by DDR4 won't really be utilised in general use, but you'd probably reap some benefit in games. You'd also see some boosts in tasks such as video transcoding. The gains may be minimal, Ian, but is it really worth compromising and going with Haswell – or Skylake with a DDR3 motherboard, for that matter – for the sake of less than £15? I think you know the answer to that.

▼ Does DDR4 offer any tangible benefit over DDR3? And is there a valid argument for avoiding Skylake on the grounds of cost? [Benchmarks courtesy of www.anandtech.com]

regardless of the percentage, DDR4 wins 11 times compared to DDR3 getting 8, and almost of DDR3's wins are minor except for two-way SLI. It would seem that for two-way SLI DDR4 at least brings up some of the minimum frame rates.

Pulling out the >3% difference numbers, just to see what the numbers exactly are:

	DDR3	DDR4
Hybrid x265	1.41	1.36
Agisoft PS v1.0 Total Time	20.68	19.60
WinRAR 5.01 Time	70.91	61.07

	DDR3	DDR4
F1 2013 1x770 Minimum	111.9	117.8
Tomb Raider SLI Avg	97.5	93.6
Sleeping Dogs SLI Avg	110.0	105.7
F1 2013 SLI Min	104.9	112.6
Sleeping Dogs SLI Min	56.7	61.3

On the face of it, the Hybrid result does not seem that different, whereas a full minute on Photoscan or 10

Assault On Battery

I've got a problem with my Tesco Hudl tablet. Basically, it won't charge. It won't switch on at all now, but I'm pretty sure that's because the battery's flat. When I last managed to use it, I tried three different chargers – it didn't register any of them. One day the Hudl worked; the next day it was kaput. Unfortunately, the warranty ran out ages ago. Is there a fix, or should I admit defeat and buy something new?

L Priest, Gmail

The Hudl and Hudl 2 were hugely popular, but it soon became clear there were issues with build quality. A common fault with early batches of the first-generation model was a touchscreen that didn't much like touch. Both models have suffered from charging problems. In the end, I'm not sure Tesco made any money (it deserved to), and general financial difficulties mean the company's now dropped the Hudl line completely. It's focusing on its core business – selling tins of beans.

Thankfully, the charging problems can usually be fixed by replacing the USB board. For the original Hudl, this costs about £3.99; for the Hudl 2, it's around £15. Search on eBay. It's the whole board you want, not just the USB port (available for about 99p). It's not a big affair – about the size of half a finger.

I've not performed the repair myself, but it seems straightforward enough. You need to prise off the Hudl's back, lift the battery, release the ribbon cable, unscrew the board, then pull the board free from its socket. Then just reverse the process with the new board. Here's a pictorial guide: ***goo.gl/NCAEiX****. And here's a video guide:* ***goo.gl/v9zuJK****.*

Of course, this repair assumes that the USB board is actually the problem – a cracked solder joint, perhaps. That is indeed usually the case. An outside bet, though, is that there's a fault with the connecting ribbon cable or the Hudl's main PCB. I guess you'll soon find out!

Note – Although your Hudl's not in warranty, you should still give Tesco a bell on 0800 323 4060 or 0330 123 4060 (the technical-support line for electrical items). If you prefer, chat to an assistant in a live message session: ***goo.gl/jCIPz9****. Tesco is aware of the charging issues, and some while back I had a Hudl repaired or replaced three times, twice after the warranty had expired. Whether the company's still as stand-up now, I couldn't say.*

Charging problems on the Hudl are common (especially on the first-generation model), but in most cases the fix is cheap and simple

A Bar Too Far?

Years ago you explained how to get Windows XP's Quick Launch icon bar back in Windows 7. I never understood why Microsoft hid it – it's a great way to access common programs. Is there a way to get it back in Windows 10? I've bitten the bullet and upgraded.

Ray, TalkTalk

You've got a better memory than I have, Ray! I've not thought about Quick Launch for donkey's, but having now looked into it, I can confirm it's still there in Windows 10. Right-click a blank area of the taskbar and select Toolbars > 'New toolbar'. When asked for a folder path, type '%userprofile%\appdata\roaming\microsoft\internet explorer\quick launch' (without the quotes, and be careful with the spaces), then click Select Folder.

You'll now have Quick Launch in place, but you'll need to tweak it. Right-click a blank area of the taskbar again and untick 'Lock the taskbar'. Next, right-click a blank area of Quick Launch and untick Show Text, then do the same again but this time untick 'Show title'. At this point, Quick Launch will be shoved right over to the right, so use the divider bar to drag it to its rightful position on the left. You'll probably also have to adjust its width.

The final stage is to right-click a blank area of the taskbar and tick 'Lock the taskbar'. Before doing that, though, you may want to make the Quick Launch icons bigger or smaller – it depends on what you like best. To do that, right-click a blank area of Quick Launch and choose View > Large Icons or View > Small Icons. In my opinion, the small ones look odd and the large ones eat into the space reserved for normal pinned icons. And that raises a good point, Ray: icons for your most-used programs can simply be pinned to the standard taskbar, so surely Quick Launch just duplicates the same function?

It's easy to bring Quick Launch back to Windows 10, but is there much point?

Crowdfunding Corner

Home automation and ubiquitous wireless are two of the big frontiers for computing right now, so it's no surprise that Kickstarter is a hotbed of innovative products based on the ideas – like these two are!

HUB For Headphones & Speakers

HUB is a wireless device that allows you to share wireless audio with multiple listeners using any headphones, earbuds or even standard speakers. The device incorporates multiple wireless receivers, which use wi-fi to stream audio from the base unit and connect to any standard 3.5mm jack. Each receiver incorporates its own volume controls, with a mute/standby button and an LED indicator so you can see when it's active.

The receivers charge wirelessly when placed on the base unit, and one base can be paired with up to ten receivers. You can stream from any DLNA compatible server and control it with a smartphone app. Each receiver has a 4.5 hour battery life and a 50-foot range, making it easy to cover your whole home. The base unit connects to almost any source with an audio-out ability with 3.5mm RCA and optical inputs in addition to streaming, so you can share almost any sounds you like.

Units are available in black or silver, and come in either two-user or four-user versions (which affects the size of the base unit) and the number of receivers you get more than the technical capabilities). There are early bird discounts available, but if you miss those (and they're moving fast!), the cheapest price you can pay is $169 (£117) for a Hub Mini (two-user version) in black or silver. This is $30 (£20) off the expected retail price. The only downside is that there's a very long wait involved. Units won't ship until July 2017. Don't say we didn't warn you!

URL: kck.st/1RDqiTh
Funding Ends: Sunday, 22nd May 2016

Homsense Home Monitoring

Homsense is a hub with a huge variety of sensors you can use to monitor your house while you're away from it. The hubless design means you can incorporate as many as you want into your existing wi-fi network. Each sensor has the ability to detect water leaks, monitor air quality and humidity, as well as pressure, light levels, sound, motion and vibration. A magnetic docking system makes it easy to install.

You can use it almost any way you like. Check whether doors and windows are open, if a vent is blocked, if something is leaking or any other use you can come up with. Its rechargeable battery lasts for an entire year, and the magnetic mount means you can remove and replace it easily when you do have to charge it. For always-on monitoring, like baby noise, you can keep it active using a USB charge. The built-in app can deliver spoken alerts so you don't have to check your phone to see what the problem is, and you can combine it with services like IFTTT to produce complex notifications.

A single unit costs $64 (£44), which gets you a Homsense, a dock, a door magnet and a charge cable. If you want to buy three, you can get them for a discounted price of $162 (£112), and they'll all ship in November 2016 – as long as the project reaches its $62,000 (£44,000) goal, but with almost a month to do that, we expect it'll be fine.

URL: kck.st/1pK8Na6
Funding Ends: Friday, 29th April 2016

Disclaimer: Images shown may be prototypes and Micro Mart does not formally endorse or guarantee any of the projects listed. Back them at your own risk!

App Of The Week

Nutrino

This week we try and eat healthier

With summer rapidly approaching, it's customary for many to start shaping up a bit. Some folk decide to hit the gym or hit the road, while others go about shaping up with their diet. After all, a healthy lifestyle is based on what you consume rather than how much you exercise. The problem, though, is what to eat and how much of it?

Virtual Personal Nutritionist

Nutrino is an app that's designed to measure your calorie intake, exercise levels, eating habits and so on, then design a viable healthy meal plan based on that information.

When starting for the first time, the user will start to build their personal profile and input their dietary goals and preferences. Once all the relevant information is included, Nutrino will go off and create a daily meal plan for the user.

In addition – and this is clever part – Nutrino will add each meal to a weekly shopping list, which is designed for the UK. You can then purchase the ingredients and meals from the likes of Tesco or Asda, and Nutrino will also include eating out, with the likes of Costa Coffee and Café Nero included, so you can still remain on the meal plan without giving in to temptation.

It Uses Algorithms

Using the app's patented technology and algorithms makes Nutrino a far more customisable app then the usual nutritional aids.

The survey at the start of using the app includes such things as gender, age, weight and what exactly your current exercise regime is. It's also realistic in its goals; having entered little or no exercise and expecting to lose a couple of stone by the end of the month is described by the app as impossible and decidedly unhealthy, so a more realistic plan is created, one that will keep you healthy, happy and on target to reaching the goals.

It's Really Very Good

The developer, ComoComo Ltd, has done an excellent job with Nutrino. Here we have an app that's easy to read, easy to implement, targeted at UK users and realistic. It's also very inspiring in the way it includes a lifestyle of those who both eat out and in the kitchen. And it's realistic in its approach to what to eat – none of this exotic fare that Nigella Lawson has stashed away in some jar.

The eating out side of things is dealt with well too. A localised search of restaurants will offer you a list of healthier choices of meals, based on your current GPS signal. Also, it's integrated with Withings Wireless Scales, so you can keep track of how you're doing and update the meal plan if necessary.

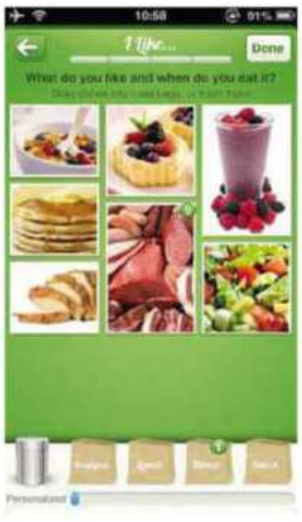
Features At A Glance

- Personalised, healthy daily meal plan based on your profile.
- Thousands of recipes available.
- Summary of daily intake – carbs, calories, fibre and fats.
- Add the meal ingredients to your weekly shopping cart and buy through Tesco or Asda, with more being added soon.

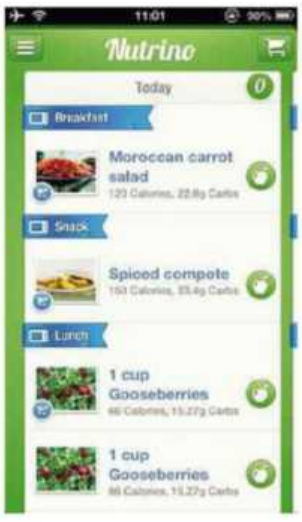
Conclusion

As Nutrino states, "There are more than one billion overweight adults in the world, at least 300 million of them clinically obese. Obesity rates have risen more than three-fold since 1980. Obesity and overweight pose a major risk for serious diet-related chronic diseases, including type 2 diabetes, cardiovascular disease, hypertension, stroke and certain forms of cancer. The health consequences range from increased risk of premature death to serious chronic conditions that reduce the overall quality of life."

I don't know about you, but that alone is enough to inspire me to start losing the excess baggage, but in a healthier manner, rather than a quick blast over summer. mm



Your healthier meal plan is based on your profile



The meals themselves are of gourmet quality

The shopping list is UK orientated

Logging Off

Just recently I got around to experiencing the new *Star Wars* movie, *The Force Awakens*. I was just 16 years old when the original film changed cinema forever, and instantly become huge fan of the original series. If you've not seen *The Force Awakens*, I highly recommend it. JJ Abrahams, it seems, actually understood what made the original trilogy so compelling, knowledge that George Lucas somehow managed to misplace somewhere between *Return of the Jedi* and the prequels.

For a brief moment in time I was transported back to 1977, and a galaxy, far, far away.

While I was considering how an outsider can understand something more clearly than the originator, I mused on Windows, and how in some way Microsoft is George Lucas of software. It's premier product had a magical time where it was fun to use, and with each new release came genuinely exciting improvements. It's hard to imagine now, but users got really excited when Windows 95 appeared – and even Windows XP!

Are they enthusiastic these days? No. They are not. Each new release is greeted with a mood that combines in equal amounts resignation and despair. You already know that some things that once worked probably won't any longer, and the certain knowledge that they've removed a feature that you use often. Other things come and go, like once famous actors that inexplicably transition to soap operas, with little or no consideration as to why they were introduced, or how long they'll be around.

Many of the latest changes I've seen to Windows 10 are generally about driving new income streams, many through blatant advertising, disturbingly. That's a huge mistake. In the same way that cinema goers like to watch movies without having the market economics of their existence shoved up their noses, Windows users are customers too. Product placement in movies can garner audible groans from an audience, and Microsoft's cynical redefining of 'free' is starting to grind in much the same fashion.

Some people reading this will be wondering what's wrong with making money, and there isn't anything. But maybe, as a user, I'd like to be treated like I'm buying into something mutually beneficial, and not just to be part of a system to fluff the egos of the obscenely rich, and their fund managers.

Like *Star Wars*, Windows was once an adventure that we were invited to come along on, and for a while it was a fun ride. Then,

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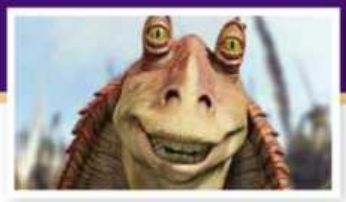


almost inexorably, it became something where personal choice was no longer part of the plan, and instead it became an exercise that we begrudgingly accepted rather than embraced.

When customers become the unwilling participant is any deal, the outcome is likely to be retailer tears, eventually. What Microsoft desperately needs is a creative visionary to come and bring Windows back to a good place, and not where it is now; Cloud First, Wallet first, customers not on this list. Too many people at that company have been inside the Redmond bubble too long, and need to step outside and experience using Microsoft products in the workplace of others.

The Windows franchise isn't yet completely trashed, but I predict Windows 10 won't be topping the list of the best Windows sequels any time soon.

Mark Pickavance

LAST WEEK'S CROSSWORD

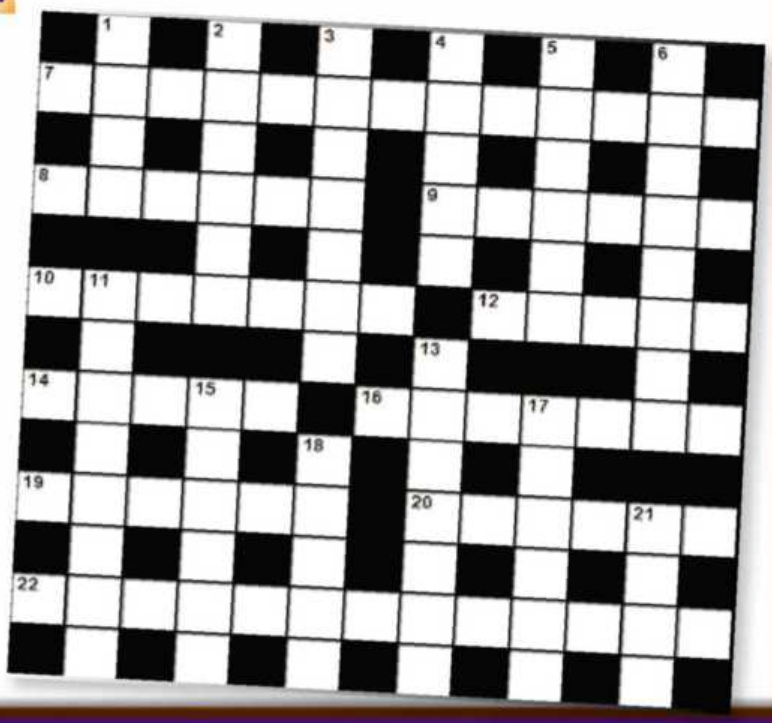
Across: **7** Ethical Hacker, **8** Ammino, **9** Rename, **10** Pentium, **12** MySQL, **14** Reset, **16** Faraday, **19** Stereo, **20** Trumps, **22** Rocket Science.
Down: **1** Atom, **2** SIGINT, **3** Canopus, **4** Share, **5** Scanty, **6** Team Aqua, **11** Election, **13** Lattice, **15** Eureka, **17** Acumen, **18** FORTH, **21** Pack.

DISCLAIMER
The views expressed by contributors are not necessarily those of the publishers. Every care is taken to ensure that the contents of the magazine are accurate but the publishers cannot accept responsibility for errors. While reasonable care is taken when accepting advertisements, the publishers cannot accept any responsibility for any resulting unsatisfactory transactions. It was April's Fools Day today, an event that seems to be very popular this year because Friday. Thankfully for us, Friday is also deadline day, so there wasn't a whole lotta prankin' goin' on around here. Judging by how badly it's worked out for Google, though, that's probably for the best, we suspect. Plus, the whole affair seems like a bit of a busman's holiday when foolishness is your stock-in-trade for the other 364 days of any given year. In fact, it may be worth us instigating at May Brainbox's Day, where on the first working day of that month we all come into the office and do something really, really clever. There's an idea... One that we may have to take a couple of weeks off to mull over. It doesn't come naturally, y'know, this ideas business. In fact we may have to treat ourselves to a coffee to celebrate this momentous event

THIS WEEK'S CROSSWORD

Across
7 Relating to the study of the form, meaning, and behaviour of words. (13)
8 Two facing pages of a book or other publication. (6)
9 Persuade a customer to buy something additional or more expensive. (6)
10 Information made available by a website or other electronic medium. (7)
12 An electromechanical device used by British cryptologists to help decipher German Enigma-machine-encrypted secret messages during World War II. (5)
14 A dealer in stolen property. (5)
16 A word that denotes one thing but refers to a related thing. (7)
19 Concern and distress caused by something unexpected. (6)
20 A film or television series based on one produced earlier.[(6)
22 American astronaut and the first person to walk on the Moon. (4,9)

Down
1 Press F1 for this. (4)
2 Divide a line or angle into two exactly equal parts. (6)
3 The process of connecting metallic items to reduce the possibility of electric shocks from faulty insulation in live circuits elsewhere. (7)
4 Maximum clarity or distinctness of an image rendered by an optical system. (5)
5 A complete failure, especially a ludicrous or humiliating one. (6)
6 Based on the 'Uncle Moneybags' character from Monopoly, he is the 'Fallout' game series' mascot, popping up when you win trophies. (5,3)
11 A short joke or witty remark. (3-5)
13 Update the display on a screen. (7)
15 Act in accordance with someone's rules, commands, or wishes. (6)
17 Abalones found near the Channel Islands. (6)
18 Welsh name for Wales. (5)
21 Immortal mastermind behind the ancient and secretive Brotherhood of Nod society in the 'Command & Conquer' game. (4)



In Next Week's Micro Mart*

- How to transform the Raspberry Pi into a laptop or deskop PC
- How to fight back against ransomware
- Can your computer ever be completely wireless?
- Plus the usual mix of news, features, reviews and advice

* May be subject to change

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